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IN THE MUNICIPAL INDEX AND ATLAS (the annual reference volume of data and condensed catalogs published by the American City Magazine Corporation) readers will find statistical material, and articles on a wide variety of municipal and public works subjects, not published in the monthly issues of the magazine.

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NATIONAL METER COMPANY *Established 1870*

4207 FIRST AVENUE, BROOKLYN, N. Y.

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SAN FRANCISCO
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Manufacturers of

EMPIRE
NASH
CROWN
GEM
EMPIRE-COMPOUND
WATER, OIL AND GASOLINE METERS

March 17, 1941.

OFFICE OF
N. J. KENNY, PRESIDENT

To Our Many Friends:

To better serve the Water Works Trade has been our constant endeavor. That our efforts have been rewarded by increased sales, particularly during the past two years, not only makes us duly grateful but imposes on us the responsibility of developing, to a greater extent, our capacity to meet your requirements in the future.

With this purpose in mind we have effected, as of today, a reorganization by which the National Meter Company will operate as a division of the Pittsburgh Equitable Meter Company, making available to our friends, the facilities of both Companies and the most complete line of liquid meters ever marketed by any manufacturer.

The sales organization which you have known for so many years will continue to take care of your needs and, with the resources of the Pittsburgh Equitable Meter Company at your command, will render you better service than ever. They are fully qualified by training and experience to advise you on your metering problems.

To all who have made the success of National possible we send our sincere thanks and promise to the best of our ability, to merit your continued endorsement.

N. J. Kenny
President National Meter Company
Division of Pittsburgh Equitable Meter Company

Your attention is directed to the announcement of the Pittsburgh Equitable Meter Company on pages 22 and 23.

Empire METERS

Census Studies of Metropolitan Areas

Forthcoming Reports of Sixty Areas

THE maps here reproduced are of 7 of the 60 metropolitan districts throughout the United States for which statistics of population and of housing units are being currently released by the Bureau of the Census. The statistics confirm the forecast, frequently made, that the 1940 census would show, for most of such areas, a much larger proportionate growth immediately outside than within the limits of the central city.

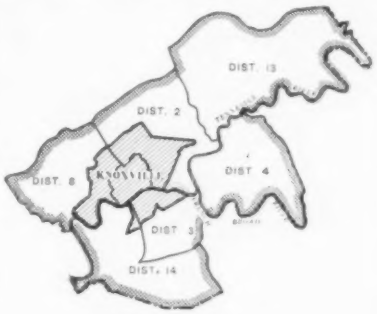
The 60 "tract" areas, on which reports will be available as released by the Census Bureau, are:

Akron, Ohio	Long Beach, Calif.
Atlanta, Ga.	Louisville, Ky.
Atlantic City, N. J.	Macon, Ga.
Augusta, Ga.	Memphis, Tenn.
Austin, Texas	Milwaukee, Wis.
Baltimore, Md.	Minneapolis, Minn.
Berkeley, Calif.	Nashville, Tenn.
Birmingham, Ala.	Newark, N. J.
Boston, Mass.	New Haven, Conn.
Buffalo, N. Y.	New Orleans, La.
Cambridge, Mass.	New York, N. Y.
Camden, N. J.	Oakland, Calif.
Chicago, Ill.	Oklahoma City, Okla.
Cincinnati, Ohio	Paterson, N. J.
Cleveland, Ohio	Philadelphia, Pa.
Columbus, Ohio	Pittsburgh, Pa.
Dallas, Texas	Portland, Ore.
Dayton, Ohio	Providence, R. I.
Denver, Colo.	Richmond, Va.
Des Moines, Iowa	Rochester, N. Y.
Detroit, Mich.	St. Louis, Mo.
Duluth, Minn.	St. Paul, Minn.
Elizabeth, N. J.	San Francisco, Calif.
Flint, Mich.	Savannah, Ga.
Hartford, Conn.	Seattle, Wash.
Houston, Texas.	Syracuse, N. Y.
Indianapolis, Ind.	Toledo, Ohio
Jersey City, N. J.	Trenton, N. J.
Kansas City, Mo.	Washington, D. C.
Los Angeles, Calif.	Yonkers, N. Y.

PORTLAND, MAINE

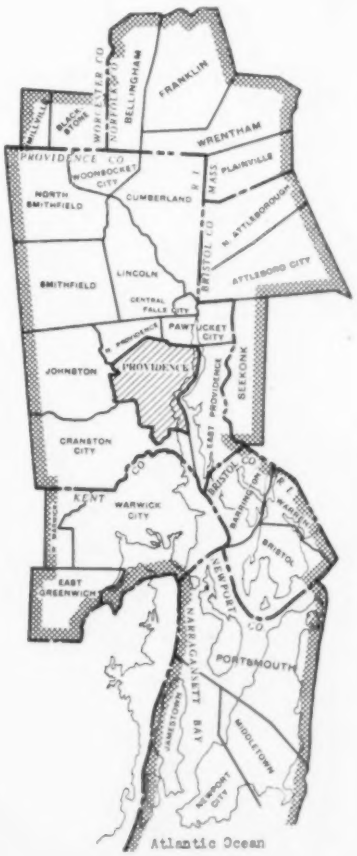
	1940	1930
Metropolitan district	106,566	99,874
Portland city	73,643	70,810
Outside of city	32,923	29,064

Each release covers the population of the metropolitan district in 1930 and 1940, with increase (or decrease) in number and percentage during the decade; and the total number of dwelling units, both occupied and vacant. Similar figures are given for the total area of the metropolitan district outside of the central city, and for each of the incorporated places and minor civil divisions within the area.



KNOXVILLE, TENN.

	1940	1930
Metropolitan district	151,829	135,714
Knoxville city	111,580	105,802
Outside of city	40,249	29,912

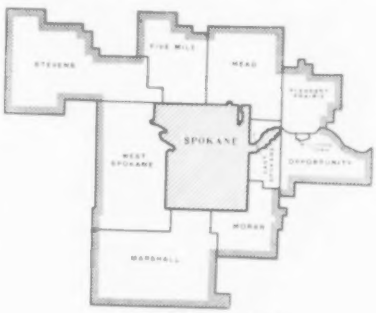


PROVIDENCE, R. I.

	1940	1930
Metropolitan district	711,500	690,631
Providence city	253,504	252,981
Outside of city	457,996	437,650

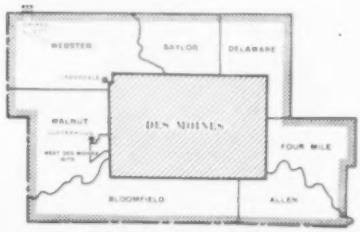
WILMINGTON, DEL.

	1940	1930
Metropolitan district	188,974	165,592
Wilmington city	112,504	106,597
Outside of city	76,470	56,995



SPOKANE, WASH.

	1940	1930
Metropolitan district	141,370	128,798
Spokane city	122,001	115,514
Outside of city	19,369	13,284



DES MOINES, IOWA

	1940	1930
Metropolitan district	183,973	160,965
Des Moines city	159,819	142,559
Outside of city	24,154	18,404

SALT LAKE CITY, UTAH

	1940	1930
Metropolitan district	204,488	184,451
Salt Lake City	149,934	140,267
Outside of city	54,554	44,184

BUSIER THAN EVER
THIS COUNTRY has the best telephone equipment in the world and this equipment has extra margins for growth and emergency. Both the growth and the emergency are here. The margins are being used.
The Bell System has two things that help a lot these days. It has experienced manufacturing facilities and a dependable, nation-wide distributing organization.
Both are handled within this System by Western Electric, makers of your Bell telephone and its related apparatus. This has been a good policy for a generation. Never have its benefits been so clear as right now when the country is under pressure.
BELL TELEPHONE SYSTEM
THE BELL SYSTEM IS DOING ITS PART IN THE COUNTRY'S PROGRAM OF NATIONAL DEFENSE

During April we hope you will remember to mention THE AMERICAN CITY.

Our Municipal Notebook

Parking Solved in Passaic

THE FIRST CITY IN THE EAST TO INSTALL PARKING METERS was Passaic, N. J. They had one of the toughest congestion problems in the country. The business district consists principally of Main Avenue, which is also the thoroughfare to Paterson, N. J. Passaic, with 63,000 souls of its own, is the shopping mecca for some 18 towns, and the business district was a mess until January, 1937, when 140 parking meters were installed. Conditions were further improved in September of that year, when 386 more were installed. In May, 1939, 37 additional were put into operation; and in September, 1939, the business district became completely metered when 546 parking meters were added, bringing the grand total to 1,109. All the meters are Mark-Times. Police Chief Charles J. Monks states that servicing and repair costs are negligible, being performed as an item of the work of the crew which does general traffic maintenance work, including the painting of traffic lines. Most of the original meters are still in operation. The 1,109 meters are supervised by three officers on Harley-Davidson three-wheel motorcycles. These officers are also assigned to any emergency jobs, and tools and tear-gas bombs can be placed under the motorcycle seats. Chief Monks says that the parking meters are just part of the regular traffic-handling machinery of the business district and require no very special attention. They were installed to open up traffic, aid flow, and make motor shopping an agreeable experience. All these results have been attained. Complaints from the bus companies about double parking have ceased. Shopping volume has considerably increased. The successive installations were made at the requests of the merchants.

She Shouldn't Talk To Strangers!

By the Associated Press.

WATERBURY, Conn., Dec. 18.—A woman motorist, parking by an upright hollow pipe on a street where parking meters were being installed, asked a boy:

"Where do I put my money in?"

"Right in there, lady," he replied. Down the tube went three cents. The lady went off. So did the boy, but he was back in a moment with a stick, on the end of which was a wad of chewing gum.

Accurate Magnification of Fine Music

As the radio has brought distant entertainment and instruction to millions, so perfected sound equipment is bringing local music to many thousands, instead of a few hundreds or a thousand or two spectators. The Western Electric pick-up and amplifying system installed in Grant Park, Chicago, is said to have multiplied the seating area three times. The operator picks up the entire orchestra by means of a single microphone and, by a remote control panel, adjusts the over-all volume in accordance with weather and size of audience. The amplifiers handle the full symphonic range without distortion.

Note the two-element loudspeakers and (center) the remote-control panel where the volume of music is adjusted, in band-shell in Chicago's Grand Park

Up-to-Date

MOST MUNICIPAL OFFICIALS REALIZE that new ideas are part of the present, of every present, and that progress consists as much in their use as in their development. The more rapidly they are adopted, the more quickly they are improved and perfected and made standard modern practice.

In municipal finance offices, during the last six or seven years, the accounting machine has annihilated time; and the microfilm which condenses records into a hundredth of the room occupied by the original record is annihilating space.

In the municipal electric plant, enclosed or metal-clad switchgear is the mark of an up-to-date progressive enterprise and management.

In the police department, it is the rescue truck equipped to master any emergency, and the two-way radio system designed to suit the local conditions, which date the department. In the fire department, it is up-to-the-minute equipment and properly trained men that define the type of chief.

Modern equipment is of course important for its production and performance. It may be even more important as indicating the presence of a modern-minded, alert manager or superintendent, or mayor or council. The production method of accounting, for instance, could hardly be operating in a backward city. An army with old ideas and obsolete equipment is the doomed army of a doomed nation. Fortunately, municipal governments are taking much more advantage of the genius and energy of American industry than they ever did before; and they are winning recognition as the original political force of democracy.

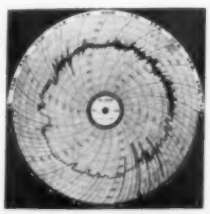
A Safer City

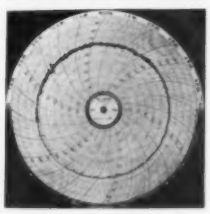
DURING 1940 the city of Schenectady, N. Y., bought a Mack pumping engine and an American-LaFrance aerial, replaced 254 old street lights,

2 New ELEVATED TANKS

INCREASE FIRE PROTECTION at Kankakee, Illinois

RIGHT: Top chart shows pressure in Kankakee water mains BEFORE elevated tanks were in service. Lower chart shows pressures at same location AFTER tanks were installed.





LEFT: 750,000-gal. radial-cone tank. RIGHT: 200,000-gal. ellipsoidal-bottom unit.

A study of the water supply system at Kankakee, Ill., made by the National Board of Fire Underwriters, revealed the fact that existing filters and storage facilities limited the capacity of the system to slightly below maximum consumption and fire flow demands. Following recommendations of this organization, the Kankakee Water Company installed two new elevated storage tanks in its distribution system. One is a 750,000-gal. radial-cone unit located in the business center, and the other a 200,000-gal. ellipsoidal tank in a northern subdivision.

In addition to providing increased fire protection, these two new Horton tanks have helped to eliminate pressure variations in the distribution system, as shown in the above charts. This is another example of the way in which modern elevated storage helps to solve municipal water supply problems. Let us send you complete information or estimating data.

CHICAGO BRIDGE & IRON COMPANY

Chicago	2127 McCormick Bldg.	Philadelphia	1616-1700 Walnut St.	San Francisco	1033 Rialto Bldg.
New York	3308-165 Broadway Bldg.	Boston	1501 Consolidated Gas Bldg.	Houston	918 Richmond Avenue
Cleveland	2236 Builder's Exchange	Birmingham	1502 N. Fiftieth Street	Tulsa	1625 Hunt Bldg.
Detroit	1501 Lafayette Bldg.	Dallas	1606 Praetorian Bldg.	Los Angeles	1403 Wm. Fox Bldg.

Plants at BIRMINGHAM, CHICAGO, and GREENVILLE, PA. *In Canada:* HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

Water-Works Revenue and Operation

Honolulu Water Rates Recently Revised

SINCE THE PUBLICATION of the water rates and service charges of the city of Honolulu, Hawaii, in THE AMERICAN CITY several years ago, a number of minor changes have been made in the rates, which are published below through the courtesy of Frederick Ohrt, Manager and Chief Engineer, Board of Water Supply, Honolulu, Hawaii.

The present population of Honolulu is 179,359, 171,000 of which are served by the water works through 23,956 services having 23,931 meters.

A service charge is made for each meter installed on the system, as follows:

For a Service with a	
⅝" meter	$0.50
¾" "	.75
1" "	1.00
1½" "	1.50
2" "	2.50
3" "	5.00
4" "	7.50
6" "	15.00
8" "	25.00
10" "	45.00
12" "	75.00

In addition to the service charge, all water used is charged at the following rate:

	Cents per 1,000 Gallons
First 25,000 gals. per month, or any part thereof	18
Next 225,000 gals. per month	14
Next 1,000,000 gals. per month	10
All over 1,250,000 gals. per month	8

All shipping, foreign, coastwise, government, inter-island and fishing vessels, pay for water taken aboard at the rate of 50 cents per 1,000 gallons.

A monthly service charge based on the size of the pipe connecting a straight automatic sprinkler service with the straight main takes care of fire services. No connection for other purposes is permitted, and such sprinkler services must be connected to an alarm system or otherwise protected against theft, leakage or waste of water. The monthly service charges are as follows:

2" service	$0.75	per month
3" "	1.50	" "
4" "	2.25	" "
6" "	4.50	" "
8" "	7.50	" "
10" "	13.50	" "
12" "	22.50	" "

No charge is made for the water actually used through these services for fire-protection purposes. These rates are collected monthly with no penalties or discounts, and water rates do not become a lien on property. No revenue is derived from the city government for fire-hydrant service.

Domestic and commercial services connecting to the water mains are paid for originally by the property owner. The Board of Water Supply furnishes the meter and meter box, and then the services are maintained perpetually by the Board of Water Supply up to the property line.

The Value of Reports in Plant Operation

RECORDS OF THE OPERATION of water-purification plants vary widely, generally in accordance with the type of purification systems maintained. In general, operation reports from purification plants should cover a period of one calendar week, on which should be incorporated the daily results. These results may record a single determination or the average of a large number of determinations made at various intervals during the day. The report forms need not necessarily contain all the data which the operator might deem necessary to secure in order to enable him to operate the purification plant properly. Any other data secured by the operator, however, should be recorded in a log-book for future reference.

Plant records are essential for the following reasons:

1. To indicate to the operator that the proper type of treatment has been adopted for producing satisfactory results.

2. To serve as a record of the quality of the water furnished to the public against possible complaints of furnishing water of an inferior quality.

3. To establish definitely the fact that the water is of a quality which will not produce disease.

4. To serve as a guide for future operation in the light of past experience.

5. To facilitate the compilation of reports which must be furnished to responsible officials.

6. To furnish information which might be of assistance in recommending new types of treatment or extensions of plant facilities.

Purification-plant records are of value to the operator only to the extent to which they are used as yardsticks for determining the efficiency of the various units and the plant as a whole. Their main use lies in the fact that they enable the operator to show from the actual results obtained that he has properly predetermined the type of treatment and amount of chemicals used in the process and, further, to confirm his judgment in the operations performed.

—From a paper presented by L. S. MORGAN, District Engineer, Pennsylvania Department of Health, Greensburg, Pa., at the Twelfth Annual Conference of the Pennsylvania Water Works Operators' Association.

American Water Works Association
Toronto Convention
June 22-26, 1941

The water-conditioning plant built in 1938-39 at Lansing, Mich., to soften and treat 70 mg of water daily. Otto E. Eckert is General Manager of the Board of Water, Electric and Light Commissioners; Alvord, Burdick & Howson, of Chicago, Ill., were the consulting engineers; and Lee Black and Kenneth C. Black of Lansing were the architects

BACKBONE ... OF A BIG DAY'S WORK!

A 1941 FORD TRUCK does a big day's work because it:

- ★ Is *built* for hard work from the *inside out.*
- ★ Has more horsepower (95) than any other low-priced truck—delivers high torque over a wide range of road speeds.
- ★ Has the strongest chassis ever built by the Ford Motor Company, America's most experienced truck manufacturer.
- ★ Has *extra* big brakes, *over*size clutch, *extra* heavy springs and the *biggest* spindles and bearings in front wheels of any comparable truck.

These and other features *insure extra strength where extra strength counts!*

Make a searching "on-your-job" test of Ford ruggedness—and FORD *economy*—already proved on every type of job!

FORD CAB-OVER-ENGINE TRUCKS *maneuver easily in traffic and crowded loading spaces and alleys. Wheelbases of 101", 134", and 158" accommodate standard and special bodies . . . give large payload space with short over-all length.*

FORD TRUCKS and COMMERCIAL CARS

Ford

Sewers and Sewage Treatment

"Engineering"
One of Four Plaques to Be Placed at the Jamaica, N. Y., Sewage Works

Decorative Plaques at Sewage Works

THE ART COMMISSION OF THE CITY OF NEW YORK recently gave approval to the plaster models for a series of terra cotta plaques to be placed on the tower and face of the Jamaica sewage-treatment plant, Jamaica, Queens, Long Island.

Two of the plaques (shown with this item), created by Joseph Konzal of the Sculpture Division of the New York City WPA Art Project, depict the two primary problems of sewage treatment, namely, engineering and chemistry. They are done in a somewhat stylized realistic vein, executed in low relief, and will measure when finished 41 inches in diameter. The two remaining plaques are seals of the City of New York.

The photographs were furnished through the courtesy of the New York City WPA Art Project.

"Chemistry"
Another plaque for Jamaica. The two not shown are seals of New York City

Twin Imhoff Plants Serve 5,000 Population

THE VILLAGE OF HILLSBORO, OHIO, is situated on the top of divides running at right angles with the main streets, forming a huge raised cross. When it came time to draw plans for sewage treatment, it was decided that two Imhoff and trickling filter plants would be most economical. In view of the fact that the population has not increased in the last 50 years, it was decided that the population base for design could be 5,000. The design flow through the plants was based on 100 gallons per capita per day.

In the treatment plants the trunk sewer empties into a screen chamber provided with bar screens which are manually cleaned. The settling capacity of the Imhoff tank is based on 3 hours retention with a sludge storage capacity of 2.5 cubic feet per capita. The effluent to the 1,000-gallon dosing chamber is screened, and the chamber has a single 5-foot siphon. At each plant two trickling filter units are provided; those at the south plant are 75 feet in diameter with 5 feet of filter media, while at the north plant they are 85 feet in diameter and 8 feet deep to care for the additional load contributed by a milk-condensing plant. These filters were decided upon because of the requirements of the system based on tributary population of 2,500 people with 0.16 pounds of oxygen demand per capita per day, giving a total of 400 pounds of oxygen daily. Assuming 40 per cent removal of B. O. D. in the Imhoff tank, a load of 240 pounds would be placed on the filter. With an allowable filter loading of 300 pounds per acre-foot, about 35,000 cubic feet of filter media were required.

Two open sludge beds, each 32 x 60 feet in area, at each plant, provide 1.5 square feet of sludge drying area per capita. All flow from the structures is by gravity, no power being required to operate either plant.

The work was completed on October 1, 1940, at a cost of $500,000, which includes both Federal and sponsor's contributions. Burgess & Niple, of Columbus, Ohio, were the consulting engineers on this project.

Long Sewer for Barracks Installed in 61 Days

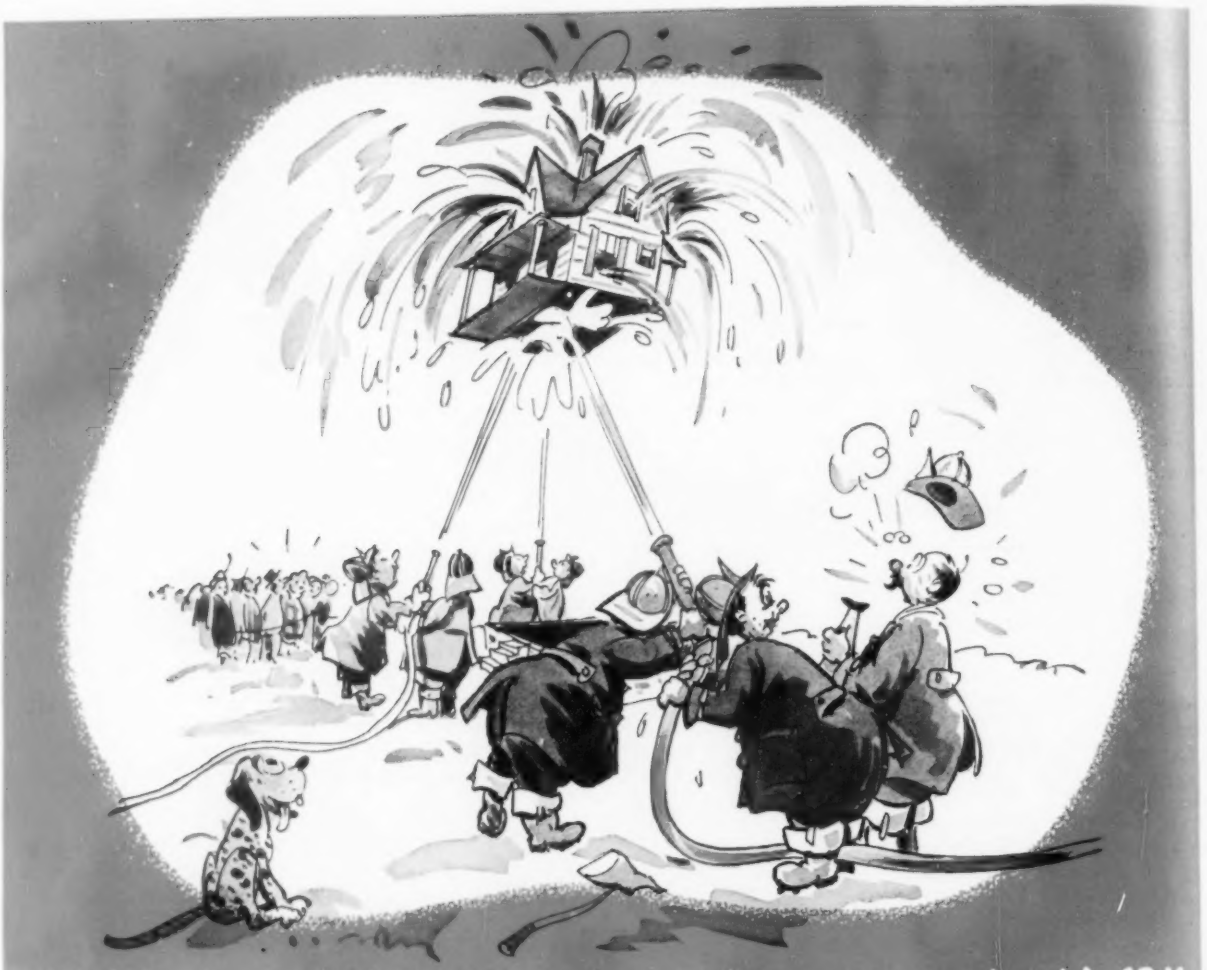
A DEFENSE CONSTRUCTION JOB RECORD is claimed for the completion of an 18-inch sewer line 9,000 feet long to care for the sanitation of new barracks for the Army Air Corps at Bowman Field on the outskirts of Louisville, Ky. The job was completed in 61 days in spite of the fact that the bulk of the 9,000 feet of vitrified clay pipe was laid in solid rock in the bed of a creek. A charge of dynamite every 9 inches of trench was required in practically all the work.

All joints for the sewer line were of the poured asphalt type, and a 3-inch concrete slab was poured over the line for its protection. The job required 12 concrete mixers, 32 pumps, and 14 compressors; and the total cost of the work, which involved the employment of 400 men, was $115,095.

The new sanitary sewer line will serve the camp, made up of 124 buildings now under construction to accommodate 196 officers and 2,236 enlisted men, comprising the crews of 67 light bomber planes.

Immediately upon completion of the sewer the WPA shifted its forces to the construction of a 12-acre concrete apron and the extension of the runways.

Night Work on the Air Corps Barracks Sewer Line in the Seneca Park Section, Louisville, Ky.



"Macks have rather unusual pumping power—eh, chief?"

Type 85, 750 Gallon centrifugal pumper with flood light equipment, a special cab and room for 2,000 feet of hose.

WHEN the lines are laid out from a Mack Pumper, officials and firemen know they can count on that Mack to keep the pressure up until the last spark is dead. It is generally acknowledged that Mack is unsurpassed in pumping power and stamina—and road performance, as well.

We feel that Mack quality is directly traceable to the extremely exacting standards under which Macks are manufactured. Vital parts—made in *Mack* factories—are made to remarkably close tolerances and of the highest quality materials.

And behind the design and production of every part is the knowledge and skill gained from Mack's large-scale research program. Mack resources, the largest in the industry, make this unique program possible.

Mack resources also make available a country-wide network of 70 conveniently located direct factory branches—for extra quick, economical and efficient service.

Write for complete information on this superior fire apparatus today!

The Mack Fire apparatus line includes triple and quadruple pumpers from 200 to 1500 gallon capacity, hose wagons, city service ladder trucks, squad cars—comprising 14 distinct and specialized models. Mack is proud of building the best. We invite comparison. We solicit inquiries.

Mack

MACK MANUFACTURING CORPORATION, FIRE ENGINE DIVISION, NEW YORK, N. Y.

Do you mention THE AMERICAN CITY? Please do.

Refuse Collection and Disposal

One of the New Fleet of Fourteen Trucks Recently Added to the Refuse-Collection Service in Montreal

Refuse Collection in Montreal, Canada

The City of Montreal has a fleet of four trailer-type trucks with a capacity of 2½ tons or 18 cubic yards, and 14 regular type trucks with a capacity of 2½ tons or 10 cubic yards, for the collection of refuse. These are all General Motor chassis and Gar Wood bodies. The trucks were acquired in 1937—Montreal being the first city on the North American continent to make use of this new type of sanitary trucks provided with compression devices to pack the load solid, permitting hauling a greater amount of refuse in each load.

Each of the trucks covers an average of 30 to 40 miles per day, the trailers making two collections a day, and the regular trucks making four collections each day. Thirteen old 5-ton open-body trucks and 35 horse-drawn vehicles were laid off when the new equipment was purchased. The old vehicles were used in districts distant from disposal points. The new equipment operates at much better speed, and distance does not count as it did in the past.

The number of men required on each unit has been reduced from four for the old vehicles, to two for the new trailers and trucks, resulting in a considerable saving in the cost of operation.

—Data furnished through the courtesy of J. E. Blanchard, Director of Public Works, and V. Savard, Superintendent of the Incineration Department, Montreal, Canada.

Refuse-Disposal Costs in Schenectady

The Waste Disposal Bureau of Schenectady, N. Y., comprising waste-collection dump maintenance, incineration and sewage pumping and disposal, employed from 150 to 202 employees at an expenditure of $297,973.41 in 1939, for the operation of the Department, equal to $3.14 per capita. The completion of the municipal refuse incinerator and the inauguration of the city's first sanitary disposal process for the elimination of garbage and rubbish, was an outstanding achievement. Ground was broken on the site of the old garbage-reduction plant on November 5, 1938, and the new incinerator was completed September 6, 1939.

The official performance test showed that the new incinerator would burn refuse at greater than rated capacity and maintain satisfactory temperatures producing no odors or measurable smoke. During the first four months of operation, 4,087 tons of mixed garbage and rubbish were incinerated, and although unit costs based on such a short period are not reliable, the costs during that period average $1.70 per ton of material, which it is expected will be reduced to $1.00 and $1.50.

The new incineration service made it necessary to establish new rules and regulations providing for wrapping garbage and storing unburnable material in separate containers, and the storage of garbage either separately or mixed with combustible materials. The method of collection was correspondingly changed. The collection of garbage, ashes and rubbish was fully maintained, with a minimum of complaints. Garbage collected totaled 7,691 tons, and ashes and rubbish totaled 254,428,000 cubic yards. To maintain collections, a daily report card system giving a record of the work of each gang was inaugurated successfully.

The Bureau of Waste Disposal inaugurated a safety drive, and in the operation of the 29 pieces of equipment there were few accidents. The monthly safety meeting reduced compensation cost $1,185.22 below 1938.

Eight New Federal Trucks with Gar Wood Bodies, Recently Added to the Refuse Collection Fleet at Schenectady, N. Y.

American Public Works Association
October 19-22, 1941
New Orleans, La.

THE GAMEWELL POLICE SIGNALING SYSTEM

A Major Defense Against Crime and Fire

The system includes the telegraphic code signaling, telephone, and recall features, all basic elements in police communications and contributes to public safety by ensuring an adequate patrol of the policed area and fire district. And, by providing for the swift and convenient transmission of emergency signals in cases of accident, riot, or serious crime, protects both the citizens and the police. Traffic police and other officers on fixed posts are enabled to promptly report accidents and other emergencies without leaving their posts. The recall feature enables the central station to call the patrolmen individually or collectively or to transmit to them instructions in secret police code.

A recognized factor in fire protection, the system also lends itself readily to the extension of police protection and supervision to industrial establishments, banks, hotels, and other special hazards. Citizens are also enabled to quickly secure police assistance.

A MUNICIPAL UTILITY

Invaluable as a defense against fire and crime the system is a municipal utility of exceptional merit, providing a readily accessible telephone service for all municipal employees such as maintenance men of the various departments as well as for private watchmen, mercantile police, and special officers outside of the police department.

Type CX Police Operating Desk as recently installed in Pittsfield, Massachusetts. The automatic recording outfit with time and date stamp is mounted on top of the cabinet and displays the recorded signals in full view of the operator. The desk and cabinet are of art metal. The manual transmitter at the right of the operating panel provides for a multiplicity of recall signals in code to the patrol force and for the transmission of emergency signals to the garage, hospital, and fire department. Gamewell central station equipments have been redesigned, simplified, and all operating parts increased in strength and efficiency.

Police Patrol Box—Exemplar Type

Equipped with three calls — Report, Emergency, and Telephone. The telephone service may be made to connect through the police central station with all police bureaus, officials, and other municipal departments. Multi-call boxes capable of transmitting from four to seven code signals are also available.

Police Recall Signal

The signal light is contained within a red Fresnel lens supported by a cast aluminum body. The dark shade contributes to effective signaling both by night and by day.

Write for Catalog

THE GAMEWELL COMPANY

NEWTON UPPER FALLS, MASS.

Public Safety

Connecticut Town Uses First Aid Fire Protection

THE FIRE DEPARTMENT OF JEWETT CITY, CONN., population 4,500, has worked out an advance line of defense against fire, consisting of fire extinguishers purchased by the Fire Department and placed in private homes and mercantile occupancies to afford first-aid protection before the firemen arrive on the scene of a fire.

Extinguishers of the soda-acid type are placed in homes of members of the Fire Department, of other residents, in schools, and in four shops. Schools and social clubs are similarly protected. Foam-type units are kept in the fire station. All are types approved by the Underwriters' Laboratories.

The largest factory in town is protected by a dozen or more foam units. The local utility company has equipped two of its service trucks with large chemical units, and the trucks respond to every alarm sounded by the Gamewell alarm system.

Of the 65 fire alarms which occurred in the borough during 1940, 20 fires were put out with the extinguishers alone; in 23 fires the extinguishers were supplemented with booster lines. The loss for the year was $7,000.

The Department's pumper carries both soda-acid and foam extinguishers, and anti-freeze units are being purchased for use in cold weather. Commissioner Jeffers has also ordered five gas masks.

The town has a volunteer department with several paid members to man its American-LaFrance 600-gallon, rotary gear pumper. Harold Jeffers and Mose Pepin are Fire Commissioners and Antonio Gauthier is Warden of the borough. Thomas Wakely, Secretary of the Department, says: "We find the extinguishers very handy and they have saved many heavy fire losses, especially on the outskirts."

L. W. HUTCHINS,
Director, Safety Research Institute,
New York City.

Driving in the Dark

DID YOU KNOW that it is possible to drive in darkness even with your headlights *turned on?* At 50 miles per hour it is extremely difficult for your car to be stopped within the distance you can see. At higher speeds you are "overdriving" the effective range of your headlamps, thus "driving in the dark."

Portable Pump Proves Worth

AT A RECENT FIRE in the outskirts of Arlington, N. Y., a Homelite portable pressure pump, with a 2-inch suction in the well of the burning building, supplied two 1½-inch hose lines and thus contributed to saving the structure. At a woods fire, the same pump saved the trees by pumping water from a pond. Again, the ability to pump from a creek saved a house.

Arlington's portable pump weighs only 90 pounds complete with built-in gasoline engine. With a 28-foot suction lift, the pump can fill the booster tank 1,000 feet away.

New Bus Discourages Hitch-Riding

FUTURE BUSES FOR NEW YORK CITY, including 300 on order, will be devoid of projections offering finger- or toe-holds for children. In the new design, tail-lights and license plates are embedded flush with the body, and the

Too Smooth for Fun—But Safer

marker lights at the top rear corners are omitted. Rear windows are built flush with the outside, and the bumper is flush with the bottom of the body.

The new design was approved after experiment by the New York Omnibus Corporation, and at a recent conference it was accepted by the American Car and Foundry Co., Twin Coach Co., General Motors Truck and Coach Division of Yellow Truck and Coach Corporation, and Mack-International Motor Truck Corporation.

SPARKS FROM THE COLLISION PREVENTION BUREAU, LOS ANGELES POLICE DEPARTMENT

From a Citizen's Collision Report

STATEMENT OF PARTY "A": "He was driving north on the car tracks and for some unknown reason both cars struck. It was just one of those things. No one was to blame, as they were *both* on the wrong side. He had one drink at dinner, and (payoff!) had just come from a safety meeting at an auto club."

Hearts and Flowers

LOVESICK SWAINS who drive with one hand are generally headed for the aisle of a church. Some will be fortunate and live long enough to *walk* down it, but others will be carried.

Cheaper to Live

A LIVE MAN pays two-bits for a shave; it costs $5 to be shaved in the morgue. A woolen overcoat costs $40; it may cost as high as $400 for a wooden one. A taxi to the party costs only a dollar or two for the round trip; a one-way ride to the cemetery costs $10 or more. *Stay alive and save money.*

Safety Menu

RESEARCH conducted by Uncle Sam proves that drivers living on a diet deficient in Vitamin A are subject to "night blindness," or inability to see clearly in dim light. Hint to housewives: Include leafy green vegetables, egg yolks, milk, orange and tomato juice in your menus, and you may aid in preventing a member of your family from becoming a traffic statistic.

Recipe for a Wake

TAKE ONE STEWED PRUNE, one pickled peach, and one date. Saturate the peach and the prune with brandy or gin; if unable to procure these, beer will do. Place on the seat of a high-powered car and leave on the road for 30 minutes. Then garnish with broken glass, gravel, and serve cold on a stretcher. Very attractive in light-colored box garnished with flowers.

For other material on public safety, see pages 43, 97-101, 103-107 in this issue.

That's Why

Public Transit's the Way to Move People

THE little fellows out in front are trying to tell you in their own small way that the real traffic job in our cities is moving *people*, and public transit is your most efficient helper in this all-important job—a fact demonstrated time and again by traffic studies.

One of these studies, conducted recently by the Indianapolis Railways, measured traffic flow at the intersection of two busy streets in the heart of the Indianapolis business district. It was found that public-transit vehicles, which constituted *only 10 per cent* of the traffic at this bustling intersection, carried *70 per cent* of the people being moved. That's because transit vehicles carried an average of 27 passengers per vehicle, whereas private motor vehicles carried an average of only 1.4. These figures show that public transit, in terms of *moving people*, is by far the most efficient user of street space.

Such a study in your city would undoubtedly show similar results. It's obvious, then, that public transit has a big job to do—a job it can't do alone. Co-operate with public transit—a remedy for traffic congestion that *pays its own way*—and you'll be doubly rewarded. City life will be more efficient and your citizens will be happier. General Electric, Schenectady, New York.

ENCOURAGE PUBLIC TRANSIT—IT HELPS SOLVE YOUR PARKING PROBLEM

GENERAL ELECTRIC

Vol. LVI, No. 4 The American City April, 1941

Buffalo's Comprehensive Plan for Relief Sewers

Provides for Stage Improvement of Sewers by Districts

By S. M. Clarke
Greeley and Hansen, Consulting Engineers
Chicago, Ill.

THE Buffalo Sewer Authority was created in 1935 by special Act of the New York State Legislature, primarily to have charge of the construction of the new sewage-disposal works. It was also given control of the entire sewer system of the city, and was empowered to provide relief for existing sewers where existing capacities were inadequate.

Some relief sewer work had already been completed by the city during the preceding four or five years, and another large project had been partially designed. This latter project was continued under the Sewer Authority, and was constructed with the intercepting sewers and sewage-treatment plant.

During 1938 a demand arose for sewer projects to be constructed under the Works Progress Administration. Some few projects were available, but the need immediately became apparent for a comprehensive general study which would indicate where relief sewers were most needed, and the approximate designs and costs of such sewers.

Basis of Study

In November, 1938, the writer's firm was engaged to establish the bases for such a study, and to supervise and make reports on the results of the work as it was completed by the Sewer Authority Engineering Department. The work on this study, which has been called "A Comprehensive Plan for Relief Sewers," has recently been completed for the entire city, and a summary report submitted. The bases of design and detailed summaries of computations for the several sewer districts have been covered in ten progress reports, issued over the two-year period, embracing 196 pages of text, 61 tables of computations and 169 figures.

The existing sewers in the city of Buffalo are on the combined plan, and are quite generally inadequate to prevent frequent basement and street flooding under existing conditions of area development. Nearly all the large sewers and well over half of the total length of sewers in the city were built prior to 1900, and the greater part of the trunk sewers are more than fifty years old. No systematic record has been kept of the occurrence of flooding, but it is known that unsatisfactory conditions exist over a large part of the city.

The area of the city is divided into two main drainage areas, the first tributary to the Niagara River, and the second draining to the Buffalo River, which in turn enters Lake Erie just above the head of the Niagara River. These two main drainage areas are subdivided into a total of twenty-five sewer districts, ten of which drain to the Niagara River and fifteen to the Buffalo River. The total sewered area is approximately 23,100 acres.

Conditions in Buffalo are particularly favorable for such a comprehensive plan, covering the entire city, in that the limits of the areas tributary to existing sewer districts are well defined, either politically or topographically, and further that a large proportion of the city is now quite well built up and the probable development of the remainder can be predicted with a fair degree of certainty. A study of isolated sections of the city would not have been desirable, since nearly all of the area is in need of relief sewers, and since in a number of instances it was necessary to consider several sewer districts together and to combine parts of two or more districts in order to arrive at the most economical design of relief sewers. The plan as completed will permit of progressive construction of the relief sewers, as regards the entire city or in the case of individual districts.

Analyzing Capacities

The method adopted for analyzing capacities of existing sewers and for determining the required capacities of relief sewers was the so-called "rational method," which involves the application of a run-off coefficient to the product of a rainfall intensity and an area. A thorough analysis of the rainfall records collected by the United States Weather Bureau over a period of 34 years at Buffalo resulted in the establishment of rainfall duration-intensity curves for several frequencies of occurrence. Based on typical cost estimates using the curves for various frequencies, and on the practice in other large cities, it was decided that the proper rainfall intensities for use in the design of relief sewers for Buffalo were those estimated to be exceeded, on the average, once in ten years. This requirement, however, was modified in some instances, where exist-

ing trunk sewers have substantial capacities, sufficient for rainfalls exceeded only once in four or more years. In such cases, these reduced capacities were considered satisfactory, and any relief required for the branch or lateral sewers tributary to these trunk sewers was designed on this same reduced basis. The capacities required for the run-off from four-year frequency rainfall intensities were approximately 80 per cent of those for rainfall intensities of ten-year frequency.

The run-off coefficients used in the capacity computations were computed with the aid of the city zoning maps, taking the coefficient for impervious areas (such as roofs and pavements) as 0.80, and for pervious areas as 0.30. The zoning maps show the city divided up into areas having various zoning classifications. Each of these classifications is defined according to use and according to the percentage of the area which may be occupied by buildings. From these requirements, and from actual measurements on several typical areas, a composite coefficient was determined for each classification of area. It was then only necessary to measure the proportion of the drainage area in question zoned for each classification.

Present and Relief Sewer Capacities

The first step in the computations for each sewer district was the analysis of existing sewer capacities. This was done by comparing actual capacities to those computed to be required for run-off from ten-year frequency rainfall intensities. The result showed that the average existing capacities in the twenty-five sewer districts ranged from 16 to 85 per cent of the capacities computed to be required, with sixteen of the districts having average capacities of 50 per cent or less of the required. In some cases the low indicated capacities are not representative of existing conditions, since the required capacities were computed on the basis of ultimate development of the areas, and certain of the sewer districts have substantial areas of vacant property at the present time. This is not generally true throughout the city, however, since Buffalo is unusually closely built up.

The computations both for existing sewer capacities and for the design of the proposed relief sewers were carried out on printed tabular forms prepared for the purpose. This made for easy checking, as well as simplifying the original work.

In the design of relief sewers it was not the purpose to provide for the relief of all lateral sewers, but in general the studies were carried far enough so that any lateral sewer would be within a maximum of two or three blocks of one of the relief sewers. No definite policy was followed in this connection, however, and in some sewer districts the designs included relief for nearly all the lateral sewers. The results of all existing sewer analyses and of relief sewer designs were summarized in tabular form in the progress reports, and condensed profiles of the proposed relief sewers were included.

Cost of Project

The total estimated cost of all the proposed relief sewers is $26,753,000, of which $989,000 is for sanitary sewers in the at present undeveloped industrial area in the southwest corner of the city. The estimated costs for storm relief sewers alone amount to $1,114 per acre, as an average, over the entire city. For the individual sewer districts, the per-acre costs vary from $224 to $1,890, the differences being caused in part by variations in existing sewer capacities, in part by variations in topographic features of the several sewer districts, and to some extent by differences in the completeness with which relief for lateral sewers was included in the estimates.

All the cost estimates were made on the basis of contract construction. Of the sewers included in the above total, there have been completed or put under construction during the past two years, as WPA projects, sewers which were estimated to cost $1,500,000 on the contract basis.

Value of the Plan

Although the accomplishment of the proposed program of relief sewer construction will necessarily be extended over a number of years, the results of the Comprehensive Plan studies will be of great value in selecting projects for construction and for determining the extent of construction necessary to provide relief for any particular locality.

The work on the Comprehensive Plan has been carried out jointly by the engineering staff of the Buffalo Sewer Authority and by the firm of Greeley and Hansen. The work has been under the general supervision of Harold Epstein, General Manager of the Sewer Authority, Francis J. Downing, Superintendent of Sewers, and Cecil F. Seitz, Assistant Engineer. The design computations in the Sewer Authority Office have been under the direct charge of Eric Riis-Carstensen and Elmer A. Hilburger. The development of the bases of design, the design work actually done by the consulting engineers, and the reviewing and summarizing in the progress reports of the work done in the Sewer Authority office have been under the direct charge of the writer.

Responsibility for Civil Defense

FROM an address, March 19, in Washington, by Frank Bane, Director, Division of of State and Local Cooperation, Advisory Commission to the Council of National Defense:

"Behind the first line of military and industrial defense is civil defense—the maintenance of the home front, health, and physical efficiency not only of the people of the United States but also of the Nation's plant and machinery, the morale and social structure of its daily life. In these broad sectors of defense the Federal Government plays a supporting rather than a leading role, for the site on which civil defense operates is the local community. Authority for making civil defense operate rests primarily upon state and local governments, and upon the responsibility and cooperation of individual citizens."

Warfare Against Fire and Crime Dramatized at Chicago

THE large photograph above shows 1,000 policemen and firemen standing at attention before 88,000 persons gathered at Soldiers' Field, Chicago, Ill., to see the third annual Police and Fire Thrill Show held jointly last summer by the two city departments, and the Chicago Park District and the *Chicago Tribune*.

The equally dramatic work of the Fire Department was performed with the pick of the 375 motor vehicles owned by the Department. These vehicles include the pumpers of 122 engine companies, the ladders and aerials of 49 hook-and-ladder companies, 10 rescue squads, 3 water towers, 7 pieces of high-pressure apparatus, and 3 floodlight wagons.

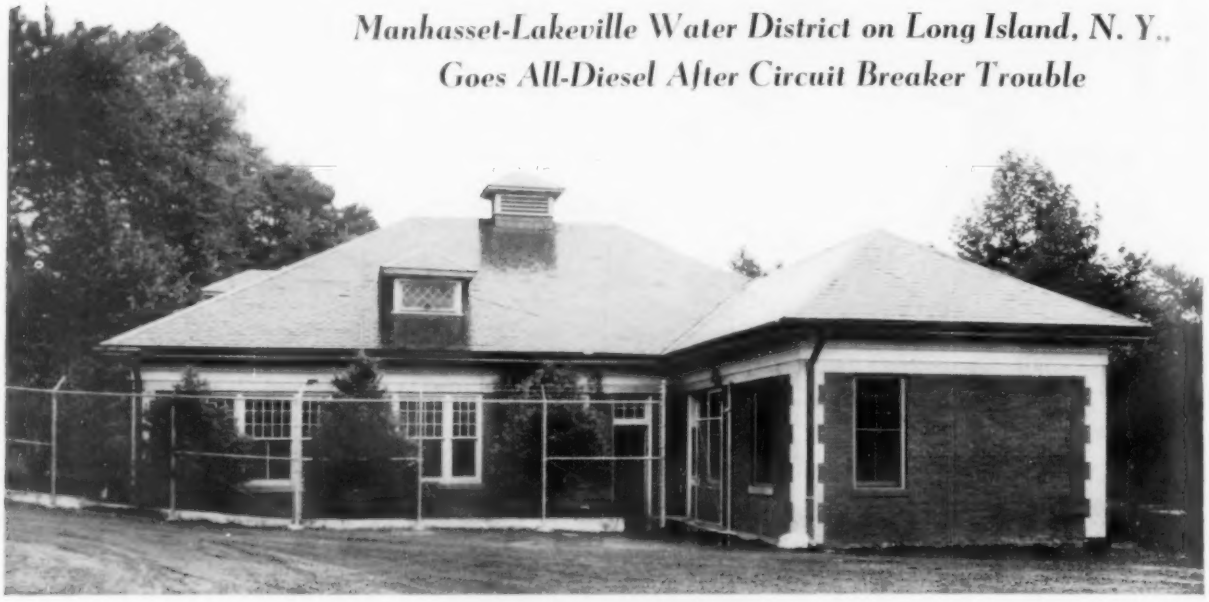
The pumping engines include one Pirsch and five Mack enclosed nine-men sedans. Six of the hook-and-ladder trucks have cabs, which is present policy. The ten open rescue trucks have been replaced by ten enclosed Mack trucks, which can turn on a circle of 44 feet diameter instead of the 67 feet required by old wagons. They are equipped with stretchers and extinguishers for rescue work and with turret nozzles of 1,200-gallon capacity. The 49 ladder companies now operate 35 aerials, and all are being converted to aerials by the installation of American-LaFrance or Seagrave aerial ladders and spring raising devices, at the rate of three per year. The three Seagrave water towers are 19 years old. Each floodlight wagon carries five 1,000-watt floodlights and one 1,000-watt spotlight of Crouse-Hinds manufacture, supplied by a 10-kw generating unit, with two 500-foot electric cables and 18 junction boxes. The lighting wagons are equipped also with a public address system which has proved so valuable that these wagons are now sent to *all* second-alarm fires, in the daytime as well as at night.

In addition, there are smoke ejectors with 14-inch pipe in 10-foot sections; chemical extinguisher apparatus equipped with Foamite, C-O Two and Du-Gas appliances; Ingersoll-Rand air compressors to provide power for breaking concrete and masonry; a new fireboat and an old one to be replaced.

Chicago's Modern Sedan Pumping Engines

Water District Power Problem Solved by Diesel Engine

Manhasset-Lakeville Water District on Long Island, N. Y., Goes All-Diesel After Circuit Breaker Trouble

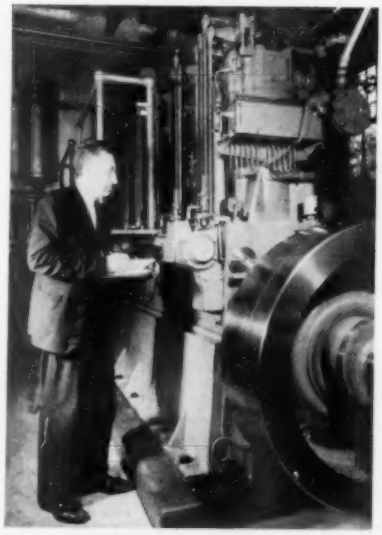


WHEN water-works commissioners can increase the capacity of a pumping station and at the same time reduce pumping power costs by around 70 per cent, it is good news for taxpayers everywhere. This is what was done in the Manhasset-Lakeville water district of Long Island, and carefully kept records are available to prove the economies.

Expansion Necessary

Prior to the spring of 1940, this station operated one motor-driven deep-well pumping unit rated at 1,100-gpm, with a 14-year-old 110-hp diesel-driven reciprocating pump, which is now used for standby service and light load periods. The large deep-well pump is powered with a 200-hp motor, and electric current was purchased from the local utility.

Constantly increasing water consumption by the growing communities served by this station necessitated expansion of the pumping facilities, so the Commission undertook an investigation of new equipment. Considerable attention was given to modern diesel-powered



J. B. Reeves, Superintendent, keeps accurate detailed records of engine and pump performance

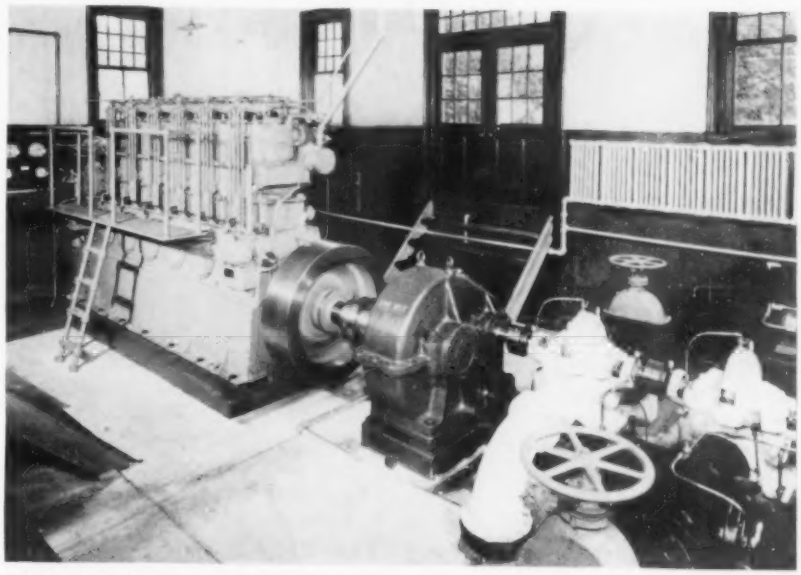
pumping units, since these are not subject to service interruption during electrical storms caused by circuit breakers "kicking out," and they provide a totally independent source of power under all emergency conditions. This was emphasized during the September, 1938, hurricane. At that time, had it not been for the old diesel unit in the station, water service would have been paralyzed for six hours until electric power was restored, and the danger from fire under such conditions is obvious. As it was, no interruption of service occurred and water was supplied to neighboring districts by connecting adjacent fire hydrants with a length of hose.

New Equipment Installed

Following the investigation made by the Commission and its consulting engineer, a new 6-cylinder heavy-duty Atlas-Imperial diesel engine, rated at 275 hp at 300 rpm and connected through a flexible coupling and a Link-Belt speed-increasing gear to two single-stage De Laval centrifugal pumps in series, delivering against a total head of 391 feet, was installed. The pumps have a capacity of 2,000 gpm each at 1,800 rpm. Practically all the engine auxiliaries are mounted integrally, except the Alnor pyrometer, an air compressor for starting, and the Maxim exhaust silencer, which is located at the rear of the building. Thus the engine and pumps form a simple, compact unit that fits easily into space previously occupied by the

old equipment. The jacket water from the diesel engine is cooled by a heat exchanger furnished by Condenser Service and Engineering Co. and located in the discharge line from the pumps. To insure that nothing but clean air enters the engine cylinders, two Lawrence Pump & Engine Co. Vortex air cleaners are installed on the intake manifold of the engine. The fuel and lubricating oil lines are fitted with Purolator filters.

For positive action and the greatest simplicity, all auxiliaries of the new pumping unit are shaft-driven, and even the vacuum pump is direct-connected to an extension of the second pump shaft. The engine cooling water circulating pump drives directly from an extension of the high-speed gear shaft on the side opposite the first pump.



The New Diesel Engine, Increasing Gear and Pair of Single Stage Centrifugal Pumps

Performance

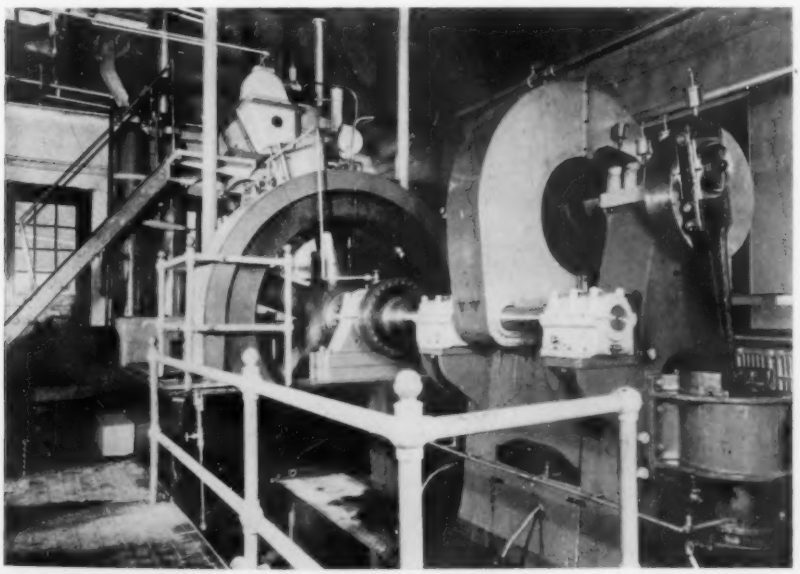
The performance of the new diesel as a pumping engine is best judged from actual data averaged from six trials made under the direction of the superintendent.

PERFORMANCE DATA

Suction lift	18.39 feet
Discharge head	161.50 pounds
Total head	169.20 "
Delivery	2038 gpm
Engine load	248 bhp
Engine speed	297 rpm
Fuel consumption	0.394 pounds/bhp/hr

Thus it will be noted that it required 110 gallons of fuel oil to pump 1,000,000 gallons of water at a total cost, for both fuel and lubricating oil, of only $8.16, allowing for periodical changes of the lubricating oil and a maintenance sinking-fund established at the rate of $1.00 per horsepower per year. The electric power cost per million gallons, at the same plant and under similar conditions, was $32.20 per million gallons; thus the new diesel installation shows a saving of 74.2 per cent, or $24.04 per million gallons pumped. The electric-driven pump carried the full station load from February, 1940, to May, 1940, while the new diesel unit was being installed, and thus earned the lowest purchased power rate possible, which averaged only 1.54 cents per kilowatt-hour.

Since no additional personnel is required by the diesel pumping unit, items of overhead can be considered constant, and the annual savings can be computed on the basis of power cost saving multiplied by millions of gallons per year. On this basis the diesel will soon pay for itself, after which the substantial difference in pumping costs can be applied against further plant expansion or modernization, or both, as future needs dictate.



The Old Diesel Engine with Its Flywheel and the Reciprocating Deep-Well Pump

A Typical Water District

The Manhasset-Lakeville Water District is typical of many such districts scattered throughout the United States. It covers approximately 16 square miles, presenting a variety of service problems. There are 28 wells at the station, ranging in depth from 140 to 150 feet, and one deep well of 428 feet. At the present time there are about 4,000 regular customers, and the steady growth that has characterized the communities served may be expected reasonably to continue.

The recent action of the Water Commissioners, therefore, in providing both economical and dependable pumping capacity against future as well as present needs, provides a worth-while example to other communities. Rising costs of government and other public

(Continued on page 85)

Street Program of 38 Miles Progressing in Clarksburg

Heavy Macadam Bases with Brick and Bituminous Tops and a Large Quarry Feature Well-Organized Work

By Theodore Reed Kendall
Engineering Editor, The American City

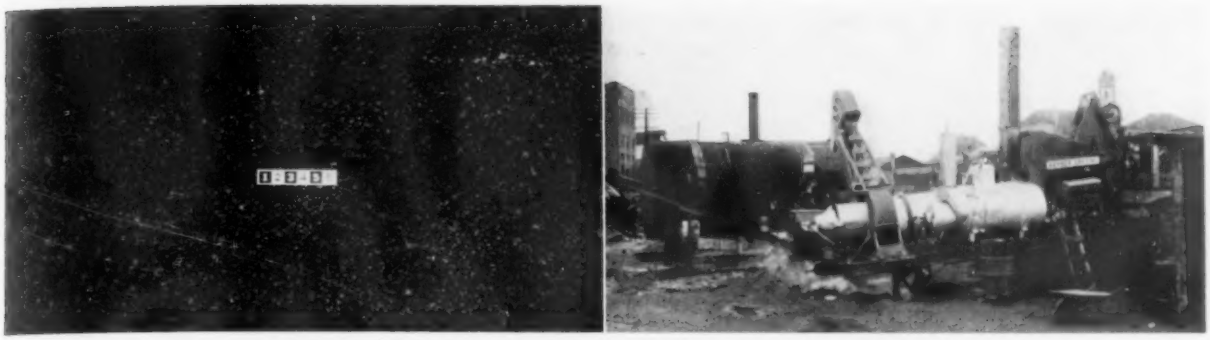
IN MAY, 1940, the City Council of Clarksburg, W. Va., passed an ordinance requiring the repaving of 38 miles of city streets under the assessment plan which has been used since the state enabling act was passed some five years ago. A bond issue of $125,000 was sold to create a revolving fund to be repaid from the assessments as the $1,000,000 project progresses. The estimated cost is $989,687, with the city's share amounting to $257,232 and WPA furnishing the labor. All costs of material, equipment and engineering are included in the front-foot assessment, which is less than one-quarter of the cost of earlier paving under the same method of assessment.

The streets being paved or repaved vary in width from 9 to 40 feet, and the work includes grading, curbs, stone base and asphaltic concrete two-course pavement, or one-course when resurfacing a solid existing pavement, and grading, drainage, stone base and new or relaid brick paving. A blanket WPA project was set up for the work, and then each individual street is a sub-project on which engineering details are completed before work is started, and are approved by the Area Engineer before work begins. All revenue from the assessments and profits goes back into a fund to retire the bonds, continue the work and eventually reduce assessments.

The Stone Quarry

A quarry 490 feet long in a sandstone ledge 42 feet high has been opened up about 1½ miles from the center of the city for the production of base stone for this huge paving project. A 315-cubic-foot Ingersoll-Rand air compressor mounted on top of the quarry provides air for three I-R jack-hammers which drill 12-foot holes, using steel Timken detachable bits. The face is shot with 40 per cent Trojan dynamite, using a hand battery. The broken material, if too large for easy hand loading, is hand-sledged to the proper size. Two trucks are used to haul the material from the quarry crews to the crushing and screening plant. One

The crushing and screening plant at the 490-foot quarry operated to provide stone for the $1,000,000 street program in Clarksburg, W. Va. One of the Load Lugger hauling outfits at the quarry is shown at the right



The Barber-Green Maintenance Mixer and Drier Located on a Railroad Siding in Clarksburg, W. Va., to Furnish up to 30 Tons of Bituminous Concrete per Hour for the Paving Projects

is a city-owned International dump-truck and the other an International equipped with a Brooks Load Lugger with two buckets.

The material is dumped into a large hopper with a wide 2-foot-high opening leading into a chute with a gate so that the rate of flow of material to the crusher can be controlled by one man who breaks out the material at the slot and another operating the gate. The crusher is a 15 x 24 Cedar Rapids jaw crusher driven by an International diesel engine. Crusher-run material is taken into bucket elevators to a circular screen where the stone is separated into two sizes, and the tailings, which were formerly discharged to a separate bin, are run in with the large-size stone and hand-sledged on the job, because the material has not been furnishing the requisite proportion of intermediate material to make a solid stone base. A crew of 70 men work on each of the two 6-hour shifts each day in the quarry, producing from 250 to 300 cubic yards per 12-hour day.

The stone quarry was cleaned up during the late summer and fall, so as to leave ample room for the storage of base stone throughout the winter, because the quarry will be operated in weather which will not permit paving. City trucks purchased with all other equipment, including the crushing plant, under a rental purchase agreement, hauled the stone from the quarry to the various projects scattered over the city.

Grading, Curb and Drainage

Grading is done with an International TD14 tractor equipped with a Bucyrus-Erie bulldozer and a scarifier. The material is piled up with the bulldozer and then loaded into trucks for removal with a Caterpillar D6 tractor equipped with a Trackson front-loading lift shovel. The base is carefully crowned 5 inches in a 24-foot road and the subgrade rolled to the same cross-section as closely as possible.

The concrete curb is poured, and then before the base is laid, the utilities, such as the Water Board and the Gas Company, enter the street and do all necessary work, so as to minimize the need for utility cuts after the paving is completed. The curb is 6 inches wide at the top, 20 inches high and 8 inches wide at the bottom, the batter being on the street side. The curb projects 6 inches above the finished surface of the pavement. Each of the five curb crews, consisting of 20 to 25 men working an 8-hour day, has its own concrete mixer and set of steel forms for the curb, so that they may be placed in different parts of the city to prepare different projects for paving and thus make the program progress with the smoothness of a production line in a factory.

At one place where a large concrete wall had been designed in the original plans, it was found that there was no foundation available which would insure the stability of the wall except by pouring an extensive footing that would have involved some additional right-of-way which is not provided for in the project. The support of the bank at this point is being done for a distance of 250 feet and a height of 12 feet, with concrete cribbing which will give adequate support to the bank and also provide much better drainage than a solid wall, even though it was adequately provided with weepers.

Tuna Street is typical of the method of handling storm-water drainage. A total of 1,200 feet of 12-inch concrete drain was installed along the project on this street, with curb inlets 36 inches wide along the curb, and with an opening 4 inches high in the curb, cov-

Relaid Brick with Grouted Joints and Expansion Joints on Baker Avenue, Clarksburg

ered with a cast iron plate and containing a square clean-out hole with cover. It is felt that the absence of gratings makes the inlets more efficient, since they are less likely to clog with leaves and small trash, which is invariably found in gutters against the curb.

The Stone Base

The stone base is built in two 4-inch layers with maximum 4-inch stone laid on a 1-inch stone dust cushion over the subgrade. Each course is spread with a 9-foot Galion stone spreader box, the oversize stone being hand-knapped to provide the extra fines required. The four men engaged in this work are all equipped with goggles to protect their eyes against flying chips. Each course is carefully choked with smaller stone and rolled with a 10-ton 3-wheel Huber power roller to a remarkable compaction and smoothness, carrying the 5-inch crown for the 24-foot roadway and a proportional crown in narrower streets. The top course of the stone base is primed with 0.4-gallon per square yard of TC3 tar, which is allowed to remain undisturbed as long as possible to cure before the surface course is placed. This is usually about two weeks.

The abandoned Weirton Steel Co. furnace and plant at the edge of Clarksburg was purchased by the Chamber of Commerce and a portion of it rented to a barrel plant. The rest of the space is used by the street paving project for storing aggregate, pipe and equipment under cover, and inside it is another galvanized iron shed for the storage of cement.

Asphalt Paving

In order to furnish the asphaltic concrete in sufficient quantities economically and at the time needed, the city purchased a Barber-Greene 840 maintenance mixer with drier, capable of producing 20 to 30 tons of bituminous concrete per hour. The plant is located on a railroad siding, where crushed limestone is delivered by commercial producers in gondola cars and unloaded by hand to two well-bulkheaded bins flanking the cold material elevator. The two sizes of aggregate are fed through side-gates in the bulkheads by hand as needed, and one man controls the flow at the cold elevator.

The aggregate for the binder course of asphaltic concrete pavement has the following gradation:

100% passes a 1" screen
90 to 100% passes a ¾" screen
50% passes a ⅜" screen
20% passes a ¼" screen

The surface course has the following gradation of stone, which has been found to furnish a slightly too open texture surface, which is now choked with screenings rolled into the surface. The gradation is:

100% passes a ½" sieve
85 to 100% passes a ⅜" sieve
40% passes a ¼" sieve
10% passes a ⅛" sieve

RC3 asphalt is purchased from the Byerlyte Co., Cleveland, Ohio, through WPA on competitive bids, and is delivered by tank car to the siding. A 12,000-gallon asphalt storage tank is located adjacent to the plant, and the asphalt is heated by a 20-hp steam boiler adjacent. A reciprocating water pump with the fiber cups removed and replaced by brass cups is used to transfer the asphalt from the tank cars to the storage tank, and from the storage tank to the measuring tank of the Barber-Greene mixing plant.

The trucks used for hauling asphalt are swabbed out with fuel oil on each trip to prevent the material from sticking to the trucks. The blacktop material is delivered to a dumping-board of boiler plate and then hand-shoveled to place, carefully raked and rolled. Each asphalt crew consists of ten men per shift working six hours a day, with two shifts each day, which lay a total of 150 to 200 tons in the 12 hours of operation. The material is rolled with a 7-ton Buffalo-Springfield tandem roller.

Only two men are required to operate the Barber-Greene plant, a boiler man and a plant operator, with four men unloading the material from the cars and feeding it to the cold elevator.

Brick Paving

For all the brcik paving, whether relaid or new brick, a 2-course 8-inch macadam stone base is laid with the same care as for asphaltic work, and a 2-inch sand cushion spread and carefully screeded and then the cleaned brick previously removed from the pavement are relaid and grouted with cement. Expansion-joint material ¾-inch wide is laid transversely in the road every 40 feet and also along the curb on the 30-foot brick-paved streets. The work on these streets also includes new curb.

The project is operated with two 6-hour shifts throughout each day for most of the operations, working about 350 men per shift, including the quarry, grading, curb crews, brick crews, asphalt plant operation, stone base and asphalt paving. Careful planning has made it possible to continue the paving operations practically through the entire winter in order to maintain the employment schedule and also permit the completion of the work before the end of the construction season in 1941. The work is in charge of James Allen, Construction Engineer, Street Improvement Program, with headquarters in City Hall, Clarksburg, and WPA operations are in charge of Earl Brane, WPA Area Engineer.

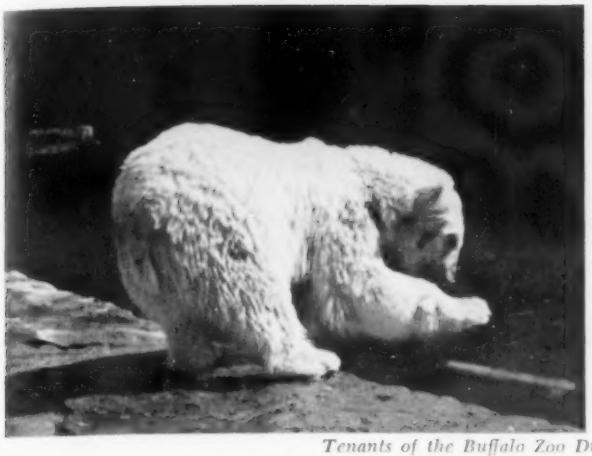
Summer Program in City and Regional Planning

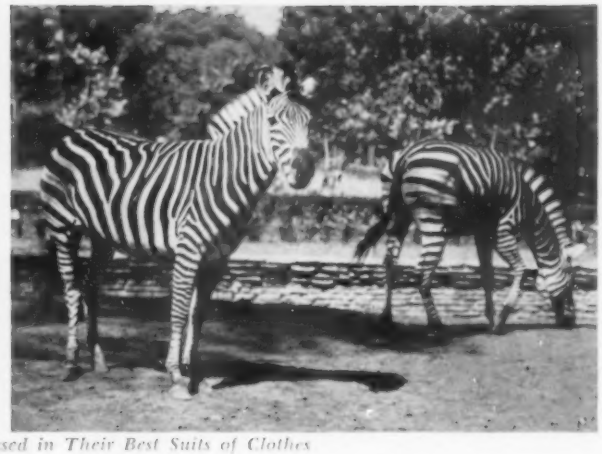
THE School of Architecture of the Massachusetts Institute of Technology and the American Planning and Civic Association are again sponsoring a short summer course in City and Regional Planning, for students and teachers of planning or related professions, technicians in practice, and members of planning boards or housing authorities.

The Program will be divided into four sections: City and Regional Planning, given each morning, from July 7 to July 18; Planning Legislation, each afternoon, July 7 to July 11; Planning Administration, each afternoon, July 14 to July 18; and Techniques of Planning, each morning, July 21 to July 25. Participants may register in one or more sections without duplication of subject matter or loss of continuity. The seminars will cover such subjects as zoning, subdivision control, traffic, master plans, housing, recreation, roadside improvement, the powers and duties of planning and zoning agencies. Recognition will be given to the requirements of the Defense Program. Opportunities will be provided for the study of design or research problems under supervision.

The fee for the entire program is $55; for the section on City and Regional Planning, if taken separately, $25, and for the other three sections $10 each, in addition to a registration fee of $5.

Applications should be sent to Prof. Frederick J. Adams, M.I.T. School of Architecture, Cambridge, Mass., not later than July 1, 1941.





Tenants of the Buffalo Zoo Dressed in Their Best Suits of Clothes

The Modern Zoos at Buffalo and Pittsburgh

BUFFALO'S new zoological gardens in Delaware Park, recently completed after five years of construction, are planned to give an appearance of spaciousness while including all the exhibits in the relatively small 23-acre area. This has been achieved partly by housing all the indoor exhibits—except Koko, the elephant, who has separate quarters—in a semi-circular building covering 56,000 square feet, and containing almost 150 inside cages, many of them with outside sections. The central section of this building, shown in an illustration on page 50, contains the smaller animals, winter quarters for monkeys, administration offices, kitchen and storage rooms, a printing shop for making zoo signs, a small auditorium, an art room, a library, and a photographic room. Through a glass pane in a swinging door, the public can see the animals' food being prepared in the kitchen.

The four other main parts of the building—two stories high in contrast to the three stories of the central section—include, besides rest rooms, a lion and a monkey house, a tropical bird house and a reptile house. The lion house has 15 inside and 15 outside cages, equipped with weatherproofed sliding doors. Heavy walls between cages prevent fighting among the animals. The monkey house consists of 14 cages, containing bars and revolving ladders designed for permanency. Plants grown on stone shelves in the windows of the monkey and lion houses lend a natural outdoor effect to the building.

Opposite this main building, at the end of a mall, are five bear pits. Between the building and the pits are the small-mammal pits, the beaver island, the American eagle cages, the pheasantries, the duck lakes, an alligator and turtle pool, a fish pond, and the sea-lion basin, located at the geographical center of the zoo because of its popularity. Grouped around outside this central section are the other exhibits—the monkey island, the elephant house, and runs for deer, bison, elk, moose, antelope, zebras, camels, emus, goats and foxes. The landscaping of the grounds has been designed to show the animals against a natural background.

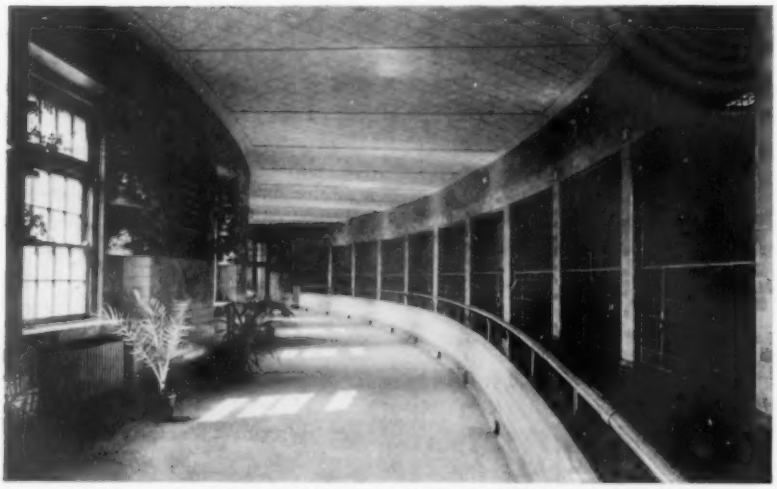
The whole project has cost more than $2,500,000, the WPA contributing $2,000,000, the city $500,000. Gray limestone, quarried on the site, has been used for buildings, pits, islands, mountains and moats. Concrete has been used wherever possible; plaster has been used as little as possible. The interior of the main building has been constructed of common red brick and inexpensive, glazed, tile-like blocks such as are often used in industrial plants and filling stations. Floors are constructed of terrazzo, a product made of marble chips. Interior walls of the building are decorated by WPA artists with murals, representing safaris in Africa and in India. The seven entrances to the zoo grounds are also decorated, with sculptures of animals.

The curator of the Buffalo Zoological Gardens, R. Marlin Perkins, has had a large responsibility in the planning of the new zoo. Architectural work on the project has been done by Henry A. Fruauff of the WPA; landscaping by Roeder J. Kinkel, landscape architect of the Parks Department.

A building to house animals involves, of course, unusual problems of heating, ventilation, lighting, sanitation, and safety. A central heating system has been installed in the Buffalo zoo's principal building without an elaborate network of underground pipes. The boiler room is located in the center of the main building, with a coal-bin nearby, large enough to hold carload lots of coal. Because cold floors harm the feet of certain animals, special warm-air ducts radiate from the boiler room under the houses of the lions, monkeys and small mammals. For certain exotic specimens, such as humming birds, desert lizards and tropical snakes, required temperature is maintained by special thermostatic controls.

The ventilation system has been

Central Section of the Buffalo Zoo Building



Lion Cages Along an Attractive Corridor in the Buffalo Zoo

Where Buffalo Monkeys Will Be at Home to the Public

designed to eliminate most of the unpleasant odors. Air is drawn in through the room, filtered to eliminate dust and dirt, and blown through tunnels, and then crosses the space from which the public views the exhibits, before going to the cages, where it escapes through vents in their ceilings.

Cages are illuminated by concealed sources of light and reflectors specially made for the purpose, and angles of visibility have been carefully worked out.

All units have been planned for easy cleaning. Floors slope to drains, and in all parts of the building are running hot and cold water. Pools or basins of water will not be allowed to stagnate in the cages.

Cage fronts of wire mesh, like that used for reinforcing material in street-paving jobs, and having a tensile strength of 76,000 pounds per square inch, provide better visibility than the old-style barred type. The doors of each cage are double-locked, with snap and padlock, and are operated from the keepers' passageway between the guard-rails and the cages.

Acoustics are still another factor that has been taken into account: both public and animal noises are considerably reduced by acoustical ceilings throughout the building.

Special Features of the Pittsburgh Zoo

Five years ago Pittsburgh considered closing the Highland Park Zoo. Now the zoo is attracting Sunday throngs of 30,000 and turning away thousands more for lack of parking facilities.

During these five years, a city WPA project costing almost half a million dollars to date has doubled the exhibits, modernized the animal homes, and instituted many other improvements. Additions and improvements to the main building, totaling $319,751, were also carried out by PWA.

The new bear dens—known as the "Barless Bear Dens"—particularly demonstrate the present-day trend of housing animals. Here bears can be seen, candidly, face to face, with no bars intervening. Protection from them is afforded by a moat 13 feet wide and 15 feet deep, which lies between the floors of the

den and the somewhat higher walkway from which the bears are viewed. Shortly after the completion of the dens, a 1,000-pound grizzly, taking a running start, made a magnificent leap for freedom over the moat, only to crash against the walkway wall three feet short of his mark, and tumble fifteen feet, unhurt, into the bottom of the trench.

Four of the dens have been cut into a natural cliff in the park. In each, a pool was constructed, and stone piles arranged to simulate the bears' native environment. (See the front cover of this issue.) The dens are 360 feet in total length, and average about 60 feet in width—large enough to allow the animals ample exercise. Inside cages have been built between the dens, equipped with a system of steel doors which provide for the transfer of the animals from one cage to another.

Native stone was quarried for the stone floors, and large stone blocks salvaged from an abandoned pumping station were used for the walls. The moat walls, and the beams and slabs used for the roof construction of the inside cages, are of reinforced concrete. One thousand cubic yards of top-soil were used for planting purposes on top of the dens, and 2,000 square yards of ground above and around the dens have been planted with trees and shrubs. Electric and water-service lines have been installed.

Islands have been built for the badgers, raccoons, and prairie dogs. The badgers now inhabit an area 26 by 44 feet, and about 8 feet deep, with the island in the center. From its floor a concrete wall rises 3½ feet above the walk level.

For the raccoons an island has been constructed of stone and hard shale, 68 feet long with an average width of 30 feet, and with a moat 6 feet deep surrounding it. Shelters have been built underneath the rock ledges, and dead trees have been erected on the island. Another similar island, built of sand and loam, has been built for the prairie dogs.

Areas have been graded, drained, and fenced for paddocks to display wild boar, elk, deer and antelope. In them, stone shelters with timber roofs have been erected, and for the elk and water buffalo mud wallows have been installed. For the deer-paddocks now under construction, workmen enclosed about 5 acres of wooded land running through and along the banks of the ravines of the zoo grounds.

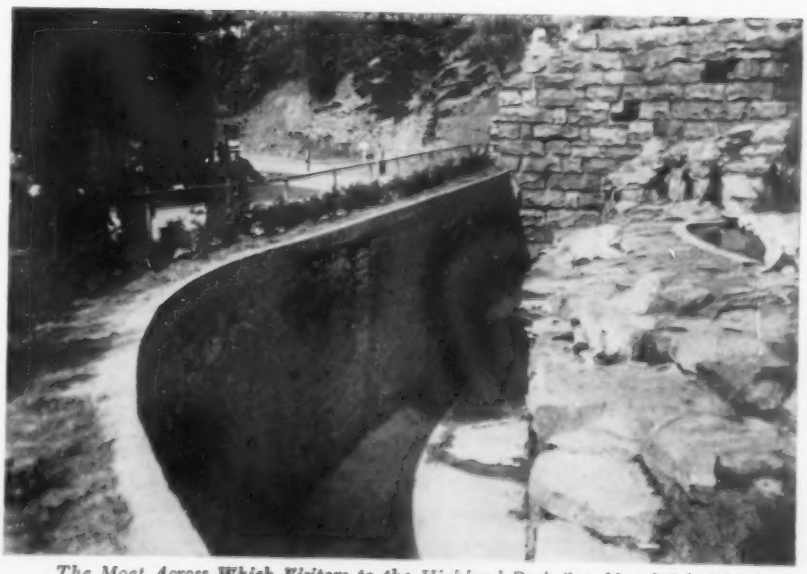
Also under construction is a giant flying cage which—enclosing trees, shrubs and a creek — will house hundreds of birds from all parts of the world. Fifty-six feet wide, 128 feet long, and 60 feet high, the frame is built of steel salvaged from the reconstruction of another project, and covered with Copperweld chain-link mesh wire. A similar smaller cage, built for the birds of prey like condors, eagles, and vultures, is to be divided into three separate sections. For the water fowl exhibit, three joining naturalistic pools with concrete bottoms have been constructed.

More than a hundred of the monkey population, or as many of the species as can agreeably live together, will soon be moved outdoors onto the new monkey island, 55 by 72 feet, built of native stone, with a dry moat 13 feet deep around it. A tunnel from the bottom of the moat will transport the monkeys to inside cages.

Another structure is a one-story, two-room brick isolation house, with frame roof and concrete floors, used for the care of sick animals.

Four thousand feet of sewer lines and 3,000 feet of water lines have been installed to serve the additional zoo facilities. The main sewer lines are 15 and 18 inches in diameter with 6- and 8-inch pipe laterals.

Main Entrance to the Highland Park Zoo, Pittsburgh, Pa.



The Moat Across Which Visitors to the Highland Park Zoo May Safely Watch the Polar Bears in Their Pit

Complete Treatment of Surface Water Supply

Braintree, Mass., Uses Alum, Soda Ash, Lime, Carbon and Chlorine with Filtration, and Treats Wash Water

TAKING water from the same source as Randolph and Holbrook, Mass., the Braintree-Randolph Great Pond, the town of Braintree finds it necessary to treat the water more completely for its domestic consumers, using both lime and activated carbon in addition to the alum, soda ash and chlorine used in the sister plant across the Great Pond. (See article in the January, 1941, issue of THE AMERICAN CITY.) The Braintree plant furnishes a domestic supply to 18,000 people in Braintree, delivering an average of 1.25 mgd through the year, and a peak of 1.9 mgd in the hottest weather.

The plant was placed in operation in 1934. In 1938, the Board of Water Commissioners put in a dam at the northeast end of the pond and raised the elevation 4 feet. At present a WPA project is in progress, building a dam at the opposite end to create an additional 164 acres of storage 10 feet higher than the present pond and containing 420,000,000 gallons. A supplementary dike, 275 feet in length, will prevent the flooding of an additional small acreage containing a few houses, the cost of acquiring which was too great for the benefits that would be secured from the slight added storage. To take care of the flow of a small brook in this area, 264 feet of 30-inch concrete pipe has been laid, draining to the lower Great Pond. The dam is 1,300 feet long and 28 feet high from the bottom of the mud, and a second dike 900 feet long extends the main dam to high ground.

Character of Water and Treatment

According to the records kept at the filtration plant, the raw water has an average alkalinity of 8 ppm and a hardness of 18 ppm. In late winter the color is at its highest, about 75, and the low point of 30 is reached when a thaw occurs in late winter or early spring. The pond has a muddy bottom on the Braintree side and when the wind is right this is stirred up, and if it lasts more than two days, the chemical treatment is intensified.

The chemical treatment with alum averages 22.7 ppm, with a maximum of 25.5 ppm in July. The use of activated carbon averages 4.7 ppm, with a maximum of 5.7 in January and July. Treatment with soda ash averages 5.6 ppm, with a maximum of 8.0 in January, reducing through the year to 0.8 ppm in November. Lime is applied at the rate of 6.7 ppm with a maximum of 7.7 in June. Chlorine for sterilizing the water averages 0.24 ppm, with a maximum of 0.31 in June. The chlorine is applied to the suction pipe of the high-lift pump.

The chemicals are delivered to the plant by truck in bags and are skidded up a wooden chute and then up the side of the building by a Robbins & Myers electric hoist. The chemicals are stored in a central chemical room on the second floor of the plant and are weighed out on Fairbanks scales before the bags are emptied into the hoppers through narrow covered openings in the floor. The chemicals are applied by three Bacharach dry-feed machines and one Syntron vibrating feeder. These four machines are located approximately at the

Exterior of the Filtration Plant of Braintree, Mass.

four corners of the floor surrounding the mixing equipment on the ground floor of the filter building. The Bacharach machines are used for soda ash, alum and activated carbon and the Syntron feeder for the lime. The water from the low-lift pumps is delivered to the mixing chamber, dosed with the proper amount of chemicals, and then stirred by a Universal Gear Works motor, reduction gear, and four paddles operating at 1 rpm as the water flows upward during its 20-minute detention period and finally leaves the chamber by flowing over the circular weir formed by the bell mouth of the pipe that leads to the coagulation basin, which has a 3-hour detention period.

Pumping Equipment

All the pumps are located in a brick pumping station close to the bank of Great Pond. The low-lift pump, an Allis-Chalmers 2-mgd centrifugal driven by a 25-hp A-C motor, is located nearest to the pond and on the lowest floor. Mounted on the same bed plate is a 4-cylinder Waukesha gasoline engine which can be hooked up quickly to drive the pump in case of power failure. The wash-water pump is located in the same room, as is also the switchboard for the control of both the low-lift and wash-water pumps.

In the doorway between the low-lift pump and the steps which lead up to the second level, which is also ground level because of the slope of the bank, is a dial gage showing the elevation of the water in the clear well and also a board gage operated by a float showing the level of the pond. The latter is read daily to determine the rise or fall of water in the pond.

On the upper ground floor is an old 1.5-mgd Platt Iron Works cross compound steam pump which is maintained as a standby unit for high-lift pumping. The high-lift pumping is done by an Allis-Chalmers 2-mgd centrifugal driven by a 100-hp General Electric motor with a second 2-mgd Allis-Chalmers centrifugal pump and driven by an Allis-Chalmers 100-hp motor as a standby. The second unit was moved from another pumping station and is to have a gas-engine drive added shortly. The motors of both these pumps have galvanized iron hoods over them to protect them from possible damage if the sprinkler system affixed to the wooden roof should operate because of fire or accidentally. The discharge from the high-lift pumps is measured and recorded by a Builders Iron Foundry venturi meter with integrating and recording device.

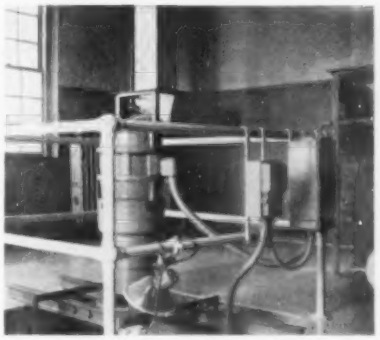
On the distribution system is a 1,000,000-gallon standpipe in East Braintree and a 500,000-gallon standpipe in Braintree.

Filtration

The plant is equipped with three rapid sand filters each 18 feet square, and each equipped with three copper bearing steel wash-water troughs. The top of the wash-water troughs is 27 inches above the top of the sand, which is 30 inches thick, supported by 18 inches of graded gravel on top of the Wheeler filter bottom. While the sand was placed in all the filters at the same time and is identical, there has been an unusual, and as yet unsolved, mystery about the sand in No. 3 filter. A hard spot about 5 feet square and from 1 to 2 inches thick appears mysteriously in the back right-hand corner and then slowly shifts its position around the right-hand half of the filter. A special wooden caisson was constructed to isolate this section so that the sand could be taken out, but it showed no unusual characteristics of fineness or of mud when examined with the naked eye, so it was thrown back into the filter and continues its migration about the filter. The filter sand has an effective size of 0.45 mm and a uniformity coefficient of 1.50.

The filters are equipped with Infilco operating tables with hydraulic valves and with rate-of-flow controllers and loss-of-head gages. Of particular value are high-powered lights suspended from the ceiling, with their reflectors about 3 feet above the level of the water in the filters, giving adequate illumination at night during operation and washing.

The pipe gallery is unfortunately quite inaccessible and is reached only through a narrow hatch in the floor at filter level and down a vertical iron ladder. The need to carry heavy wrenches for maintenance operations has already caused one accident, and plans are under way to make an opening in the front wall of the plant, which is above ground level and which is covered with a heavy earth bank attractively planted with honeysuckle. Artificial light is required throughout the pipe gallery.



The Chemical Room of the Braintree Water Filtration Plant, Showing the Mixer Drive and Two of the Four Chemical Feeders

The Wash-Water System

Wash water for the filters is pumped from the clear well by an Allis-Chalmers 400-gpm centrifugal pump with a 10-hp Allis-Chalmers motor to the 75,000-gallon steel tank immediately behind the filtration plant. In case of power failure, the wash-water tank can be filled by bleeding-off the high-pressure discharge line. Since the only place to discharge the wash water is back into Great Pond, particular care is taken to clarify it by discharging it onto a slow sand filter located between the clear well and the pond. This filter is completely unwatered and scraped twice a year.

Separate Industrial Supply

The city of Braintree maintains a pumping station on Little Pond to furnish an industrial untreated raw-water supply of 500 gpm for a gasoline refinery within city limits. A 500,000-gallon standpipe is maintained on this system.

The new filtration plant for the city of Braintree was placed in operation in 1934 and is operated under the direction of Walter M. Hatch, Superintendent of the Water Department, with Frank J. O'Rourke as Chief Engineer at the pumping station. The plant was designed by Weston & Sampson, consulting engineers, Boston, Mass.

Comfort-Station Design for Park Service

The Features of a Standard Design and How It May Be Adapted to Varying Conditions

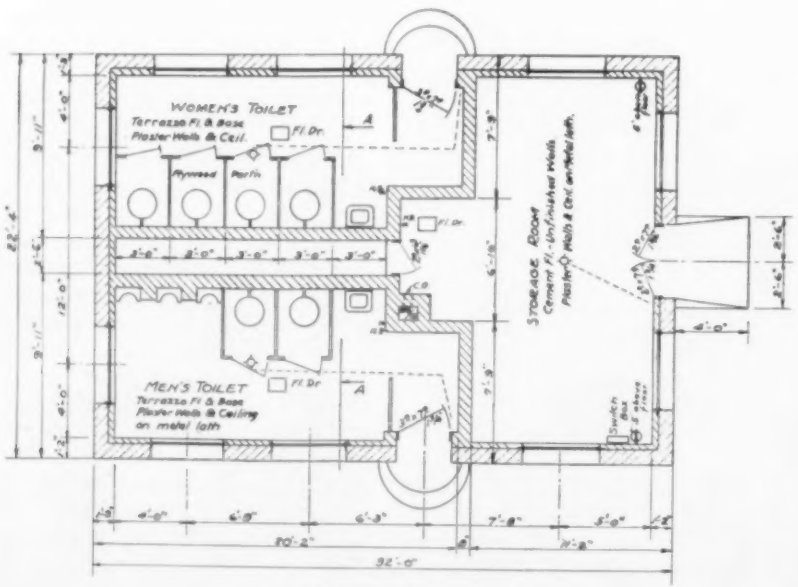
By Robert Carlton Sherwood
Civil Engineer,
Division of Parks and Boulevards,
Department of Public Welfare,
Toledo, Ohio

IN considering the features that are important to the design of a comfort station, convenience is probably foremost, since cleanliness and outer beauty are usually taken for granted. If it is one of several buildings in a park, it is assumed that it will be built to harmonize with the others in architectural design. Public demand has raised the standards of excellence in structures of this type, and it is to the unusual features incorporated in the interior of the building that this article is directed in the hope that it may prove helpful to others.

Roominess must not be sacrificed in the interest of economy, for everyone dislikes the lack of ample space in a building of this classification. The arrangement of the plumbing fixtures is also important and deserves careful study, because the location of the doors and windows is dependent in a large measure on the plumbing layout.

Features of Layout

The following paragraphs discuss the special features in our standard design, as shown in the accompanying plan. The men's and women's rest rooms are placed side by side in order that the piping may be installed in the 2½-foot space between these rooms. It is quite evident that this arrangement allows a maximum of economy in the amount of pipe and fittings as well as labor for their installation. The workmen who built these structures appreciated the extra 6 inches of space for handling their tools, since 2 feet has been the usual amount of room allowed in previous plans.



FLOOR PLAN

Plan of Effective Park Comfort Station Developed in Toledo, Ohio

The arrangement of the doorways into the rest rooms, and the screens set just inside, provide privacy to the fullest extent, even though the door should be left standing open, as is often the case. The windows are located far enough above the ground so that persons outside cannot see any one inside when the windows are open. These windows may be steel sash fitted with a ribbed wire glass that admits plenty of light and still insures privacy to those inside.

The Storage Room

The doorway of the storage room, as shown by the floor plan, is located opposite the door at the end of the plumbing space. This facilitates the handling of the long water-supply header, both at the time of construction as well as at a time when some trouble might develop that would require its removal from the building. In the other design where the storage room is used for a concession, this header can be taken out of the long window which extends almost to the center of the structure.

The floor plan shows the room across the end designated as the "storage room," but, as was mentioned above, it can be adapted for a concession, by changing the doorway and ramp to enter the side, and by adding a long window that may be used as a counter, for serving the public. This arrangement is shown in the illustration of a building adjoining Scott Park bathhouse and swimming pool in To-

ledo. The window is fitted with swinging shutters, but it would be an improvement if this shutter were hung from the top so that it would protect the customers somewhat from the hot sun and from rain. If funds were available, an awning 5 or 6 feet wide over this window would be even better than the shutter. The comfort stations built in the parks of Toledo were a part of the Works Progress Administration program, and the city lacked funds to add any items that were not deemed absolutely necessary.

The hose bibb in this concession should be carried up from the floor high enough so that a sink for washing dishes or bottles might be installed under it. This might not be considered necessary, but it would be a great convenience to the person who tends the concession. In the other type of building, in which this room is designed for the use of the park-keeper only, the water connection may be placed as shown on the plan and about 18 inches above the floor. Another item that could be useful in some instances would be pipe connections so that a hot water tank might be installed. The heat supply could be gas if it is available, or a kerosene heater that costs very little to operate; or, a pipe coil could be installed through a coal stove that is used to provide heat for the building.

In the comfort stations that were built by Federal aid in Toledo, chimneys were included in the design, partly for the sake of the appearance of the structure and partly because some reason for their use might develop in the future. Therefore, no openings were shown through the walls into the rest rooms for heat pipes or registers, but it would be very easy to include them in comfort stations that were to be used in winter months.

The door from the storage room into the plumbing space should be provided with a good lock, so that no one may get at the piping to do any damage. This may appear to be a foolish and unnecessary precaution, for it would seem strange that there might be people who would wilfully damage or destroy any part of a building erected for their convenience and pleasure. However, such instances are known, and it is well to provide the best means possible to prevent this kind of depredation.

A Stone Building Erected in Scott Park, Toledo, According to the Standard Design but Using the Storage Room as Concession Space

A hose bibb is shown in each rest room, so that the walls and floor may be scrubbed easily and often. Unless means are provided to make this work an easy task, it is sometimes difficult to secure full cooperation from employees in keeping the rest rooms clean and sanitary. By attaching a hose to the water connection, the walls and floor may be cleaned by the force of the water, and the work becomes a much more agreeable task.

Electric outlets are provided in the storage room, on either side of the building and about 5 feet above the floor, so that they will be above any work-bench with which it may be desirable to equip this room, for the park-keeper may need to do repair work to the park equipment where it is stored. He may also want to use one corner of the room for an office or temporary living quarters and therefore may need an extra light outlet.

T. Gordon Jeffery is Director of Public Welfare and Ralph C. Girkins is Superintendent of Parks, Toledo, Ohio.

The 1941-42 Officers for the American Water Works Ass'n

The Board of Directors of the American Water Works Association has announced that the persons nominated by the Nominating Committee for officers for the term which begins at the close of the 1941 Convention of the Association at Toronto and ends with the close of the 1942 annual convention have been declared elected, since no additional nominations were made by members of the Association during the period provided by the constitution.

The officers-elect are: Louis R. Howson, of Alvord, Burdick & Howson, engineers, Chicago, Ill., for President; Abel Wolman, Professor of Sanitary Engineering, Johns Hopkins University, for Vice-President; and William W. Brush, Editor, *Water Works Engineering*, New York City, for Treasurer.

Louis R. Howson, of Chicago, President-Elect of the American Water Works Association

Old Steam Pumping Station Changed to Electric Power

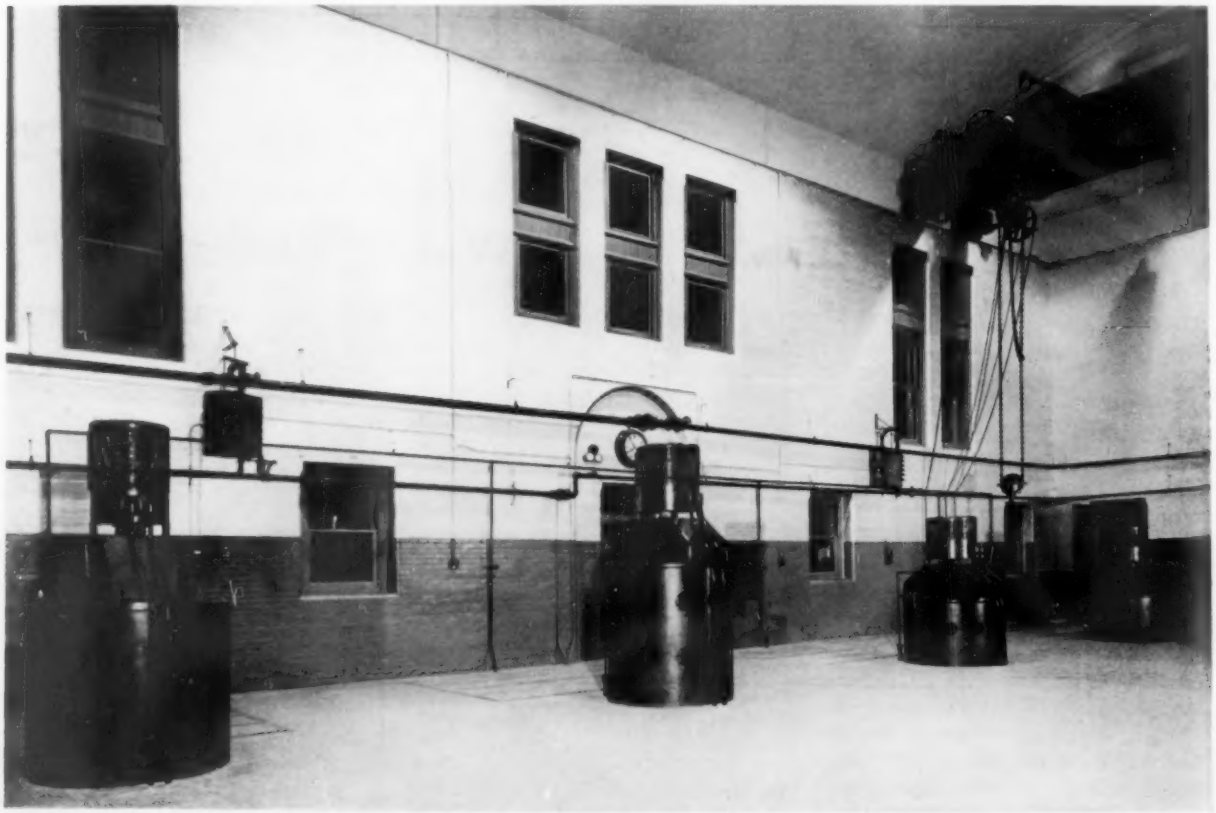
Sewage of Providence, R. I., Now Pumped by Electricity Generated at Municipal Incinerator from City Wastes

THE city of Providence has long since joined the ranks of those communities using the steam generated at a municipal incinerator to serve other municipal needs and thus effect an economy. The municipal incinerator built in 1936 and described in the January, 1937, issue of THE AMERICAN CITY, was equipped to generate steam 24 hours a day and 7 days a week by the high-temperature incineration of city garbage and rubbish. Steam turbines at the incinerator convert the steam into electrical energy which has been used to drive the air compressors for the Fields Point sewage-treatment plant since its conversion to activated sludge treatment in 1936.

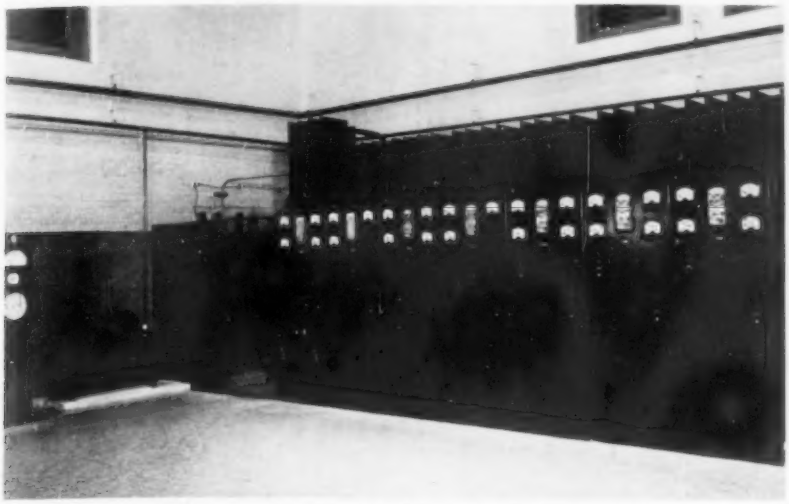
Additional use of this power has been made by the conversion of the steam pumping plant at Ernest Street and Allens Avenue to electric operation with the completion of the installation of new pumps in the summer of 1940. The old steam plant was abandoned, the steam pumping engines scrapped, and four new Warren vertical-shaft, low-lift centrifugal pumps installed in about one-fourth the area required by the old installation. The pump-house, exclusive of the old boiler room, measures 90 x 75 feet. Electric current at 2,300 volts, 3-phase, is delivered to the station only a few hundred feet away from the incinerator power plant and is used at that voltage for the pumps. Auxiliary equipment is supplied at 550 volts and lighting at 110 volts through inside transformers.

Sump and Steam Equipment

The sewage of the city of Providence flows by gravity through a 102-inch main sewer to a screen house and chamber in the basement of the Ernest Street pumping station and thence to four individual suction chambers in the adjacent pump-room. The pumps, acting as boosters, lift the sewage to a line on a sufficiently high level so that it flows by gravity to the near-by treatment plant. Hydraulically operated gate-valves have



The Installation of Four Vertical-Shaft, Low-Lift Centrifugal Pumps at the Ernest Street Station, Providence, R. I.



The Control Panels for the New Centrifugal Pumps, the Venturi Meter Register, and the Compressor for Operation of the Meters

been installed in the discharge line of each pump.

This station was originally equipped with four steam pumping engines, three of which had a capacity of 45 mgd and one 70 mgd. The pumps were all driven by rope drive from the steam engines.

The New Pumps

The four new vertical-shaft, low-lift centrifugal pumps were built and installed by the Warren Steam Pump Co. Pumps No. 1 and No. 2 are two-speed, two-capacity units, while No. 3 and No. 4 are single-speed and capacity. The No. 1 pump will deliver at the rate of 20 or 40 mgd, while No. 2 pump will deliver 30 or 60 mgd. No. 3 and No. 4 pumps deliver at the rate of 60 and 40 mgd respectively. No. 1 pump operates at either 327 or 400 rpm, and No. 2 pump operates at 277 or 327 rpm. No. 3 operates at a constant speed of 327 rpm, and No. 4 pump at a constant speed of 400 rpm.

Electric Motors

The four Warren sewage pumps are driven by General Electric synchronous motors with different numbers of poles giving the different speeds. The motors are mounted at the top of the vertical shafts of the pumps and have the following horsepower: No. 1, 150 and 300 hp; No. 2, 250 and 400 hp; No. 3, 400 hp; and No. 4, 300 hp. Pumps Nos. 1 and 2 each have two

One of the New Vertical-Shaft Centrifugals in the Basement of the Ernest Street Pumping Station

windings for the two different speeds and two different horsepowers. The total horsepower installation on the main pumps is 1,400 hp.

Control Panels

The switchboard is divided into an incoming panel, a separate panel for each speed of the two-speed motors, and one for each of the other pumps. The panels are equipped with push-button control, so that each pump may be started or stopped merely by pushing a button on its panel which operates the relays to start or cut out the motors entirely separate from any other unit. Each panel may be "killed" separately by pulling the disconnect switches above the panel with an insulated pole and hook.

Meters and Auxiliary

Each pump is equipped with an independent Builders Iron Foundry venturi meter to record the sewage pumped. The venturi meters for No. 1 and No. 4 pumps are 30 x 20-inch, and the meters for No. 2 and No. 3 pumps are each 36 x 24-inch units.

To remove leakage or ground water from the pump-room, two small sump pumps are installed in a sump well, and for priming when necessary a Nash HyTor vacuum pump is installed on the main floor, as is also a Curtis compressor for operation of the air-flow feature of the venturi meters. Both the vacuum and compressor motors are 550-volt units.

The main pump-room is heated by four Fedders unit heaters.

The Ernest Street pumping station of the city of Providence is operated under the direction of T. F. Coleman, Jr., Director of Public Works, by Markham Jones, Chief Engineer. Edward Horrigan was Inspector for the Department of Public Works during construction.

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The Special Venturi Tubes, One for Each of the Four Pumps

Street-Cleaning Practice in Berkeley, California

Hand Sweeping, Collection Truck and Deep Gutters

By HARRY GOODRIDGE
City Engineer and Superintendent of Streets,
Department of Public Works

THE Department of Public Works of Berkeley, Calif., is divided into three bureaus, one of which, the Bureau of Streets, has two divisions—Street Maintenance, and Sanitation. The Division of Sanitation includes the maintenance of sewers and the cleaning of streets.

Street sweeping is done entirely by hand, but it is anticipated that mechanical power sweeping equipment will be purchased in the near future. There are 22 men actively engaged in sweeping the streets. The sweepings are collected by three trucks working full time and one truck working part time. Each truck has a helper and a driver, in addition to the regular 22 men who sweep the streets.

Residential Streets

A distinction is made between the macadam streets in the residential districts and the hard-surface streets in the business district. The macadam streets in the residential districts are cleaned, on an average, fifteen times during the year. Over a period of eleven years, the number of times the streets have been cleaned has increased from eight to fifteen per year.

These tabulated costs include sweeping, collecting and hauling to the dump, but do not include depreciation or interest on the investment.

The expenditure per month for street cleaning varies during the year. It has been found that the expenditure in July, per mile of street, is approximately $11, whereas, during March and April, the cost is approximately $9 per mile. Over a period of 5 years the average length of street cleaned per man per day is 0.93 miles. Some men sweep as little as 3,200 feet per day, and other sweepers cover as much as 8,300 feet per day.

DATA ON THE CLEANING OF RESIDENTIAL STREETS, BERKELEY, CALIF.

Fiscal Year	Linear Miles	Square Yards	Total Cost	Cost per Lin. Mi.	Cost per Sq. Yd.
1934-35	2,214.32	15,589,863	25,160.01	11.36	.0016
1935-36	2,249.65	15,839,196	24,323.56	10.81	.00153
1936-37	2,523.99	17,767,196	25,184.95	9.978	.0014
1937-38	2,462.75	17,137,862	26,431.66	10.73	.00154
1938-39	2,501.24	17,155,119	26,100.36	10.43	.00162
1939-40	1,800.90	12,678,336	25,115.65	13.94	.00198

Business Streets

Twenty-eight miles of permanently paved streets have been patrolled by 10 men sweeping by hand. Business districts have been patrolled from four times per day, in the downtown section, to once per day, in the outlying business districts. Certain main business centers are cleaned every day of the year, including Sundays and holidays.

Because of the congestion due to the parking of automobiles, the street sweepers begin at 3:30 o'clock

A street-cleaning problem in Berkeley, Calif.—A deep gutter which requires hand operations at present. A program of filling the gutters will soon permit machine cleaning instead of present hand cleaning with the equipment shown

in the morning in the downtown sections, and 6:00 o'clock in the morning in the outlying districts.

The cost per mile on permanently paved streets is $1.59 and varies with the conditions to be met.

Berkeley's Gutter Problem

Many of the existing gutters are of the old type or design, when most of the water was carried in the gutters. Owing to the depth of these gutters, it is practically impossible to clean them properly by using mechanical or power sweepers. As funds become available, these deep gutters are being filled so that the depth of the gutter is not more than 8 inches below the top of the curb. The mileage available where mechanical sweeping equipment may be used is increasing each year, and it is expected that a more satisfactory job of street cleaning will be done in the near future, when a power sweeper is purchased.

Present Collection Units

A special type of body was developed for a truck to lessen the labor by reducing the height that the street pick-up cans had to be raised in order to empty them into the truck. The sides of the body are hinged and drop down until the truck is filled to this point; then the sides are raised and fastened in place to take care of the rest of the load. This type of equipment has proved very satisfactory.

The cans into which materials are deposited by the men are placed on the front part of a buggy. The large broom is used for sweeping an area adjacent to the curb and approximately 6 feet wide. The other small tools, including the small broom, are used in cleaning around the entrances to culverts. The buggy has rubber tires.

A large blow-torch is used to burn the weeds which grow up between the rocks in the deep gutters. These types of gutters were constructed many years ago and most of them have been removed in the program of modernization.

Special Low Body on White Truck for Easy Loading in Pick-up Service in Street Cleaning

Weed-Burning in a Rough Stone Gutter

Adoption of Codes by Reference

To the Editor of THE AMERICAN CITY:

In the February issue of THE AMERICAN CITY there was an item designated as "Adoption by Reference Saves Cost of Advertising Modern Codes."

The advice to adopt by reference is very good. I have been instrumental in helping municipalities strive to obtain state legislative action for the purpose, which would save them as much as $2,000 each time they advertise a new code. Your article, from the standpoint of economy, should be commended.

Having been a building official for over nine years and associated in code studies for over twenty-three years, I have become very much interested in the different codes existing in this country. In studying these, I have concluded most definitely that the Uniform Building Code of the Pacific Coast Building Officials Conference is the most outstanding and should be mentioned as such. I assume that your mention of the National Board of Fire Underwriters' Code was used only as an example of how adoption by reference would operate. However, I feel that more than one good code should have been listed.

The National Board code is excellent. From an administrative standpoint, I prefer the Pacific Coast Uniform Code. It ties-in fire resistance on a time-performance basis with both construction and occupancy. It was promulgated by building inspectors with no selfish interests in insurance, materials or crafts and is comprehensive and enforceable.

Other commendable codes are those of Detroit, Mich., Cincinnati, Ohio, and Minneapolis, Minn. There are others, but they are either direct copies of the National Board or the Pacific Coast Uniform codes.

Your article was a step in the right direction to enable cities to afford a code with the minimum expenditure. With an inference that there were other good codes besides the National Board code, the article would have been beyond criticism.

B. J. WESTOVER,
Manager, Building Code Consultant,
Insulation Board Institute.

Cement Lining of Pipe Corrects Bad Water Troubles

Danvers Lines 3,200 Feet of Cast Iron Feeders in Place to Reduce Iron and Bacteria in Water Delivered

By Roger W. Esty
Superintendent,
Danvers Water and Sewer Board,
Danvers, Mass.

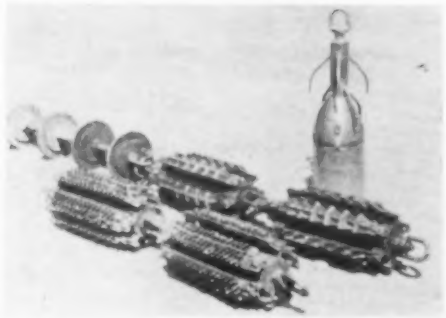
FOR over a year a feeder main of 8-inch cast iron pipe in Endicott Street, Danvers, and a 6-inch line in Clinton Avenue, had been causing complaints of high iron at the taps, and in some cases analyses showed 240 per cent as much iron in the tap water as in the water at the pumping station. Tests by the State Department of Health also showed increased bacteria in the tap water, indicating some type of contamination from within the pipe, possibly from the jute at the joints. Complaints were received stating that the water was unpalatable, but after the mains were flushed, the water became drinkable for reasonably long periods. It was felt that this condition had been aggravated by the discontinuance of a laundry customer that used as much as 150 gallons of water per minute at times. This service had been bringing in a fresh supply continuously, and as long as the laundry was taking water from the system there had been no complaints from any of the customers.

Shortly after the laundry ceased taking water, the unsatisfactory condition arose, so that it was felt advisable to call in the State Department of Health for advice. Arthur D. Weston, Chief Engineer, Massachusetts State Department of Health, sent an engineer into this area and he collected eleven samples as well as samples outside of the area for comparison. On November 13, 1939, a letter was received from the State Department of Health, signed by Dr. Paul J. Jakmauh, Commissioner of Public Health, from which the following is quoted:

"The water main in Clinton Avenue consists of about 1,500 feet of 6-inch unlined cast iron pipe which extends from Endicott Street to a dead end on Clinton Avenue. The main on Endicott Street forms part of a loop which starts near the center of the town and follows High Street, Water Street, Endicott Street and Sylvan Street to High Street. The Creese and Cook Co. tannery is located at the end of Clinton Avenue and the amount of water flowing in the main in Clinton Avenue is dependent to a large extent upon the amount of water drawn at this tannery.

"Samples of water were collected from the premises at 26 Clinton Avenue, and for comparison samples were collected from Middleton Pond, from a tap in the Danvers State Hospital, pumping station and the water-works office, and from taps in the general vicinity of 26 Clinton Avenue where complaints are understood to have originated.

"The analyses show that the water as drawn from taps on Clinton Avenue contained a much larger amount of iron than the water as supplied from Middleton Pond. The amount of oxygen dissolved in the water as drawn from the taps on



Cleaning the main before lining.—At top, the truck and winch for pulling the scrapers and brushes through the line; at left, the tools including the scrapers, and, at extreme left, the prover, which is pulled through ahead of actual lining; below, the mud brought out by the first passage of the scrapers and brooms

Clinton Avenue and on Endicott Street, in the vicinity of Clinton Avenue, showed a substantial decrease from that found in the water at Middleton Pond, while the amount of carbon dioxide gas present in the water increased. The water at Middleton Pond, the water supplied at the Danvers State Hospital pumping station, and the water supplied at the water-works office, contained a considerable number of microscopical organisms. The water as drawn from the taps on Clinton Avenue and Endicott Street contained but few such organisms, although the water in some instances contained a large amount of amorphous matter which would indicate the decomposition of microscopical organisms in the mains in this vicinity.

"Investigations by this Department have shown that the quantity of water drawn at the tannery of Creese and Cook Co. has been considerably less during the year 1939 than in the last few years, with the exception of the year 1937, in which practically no water was drawn at the tannery. In the opinion of the Department, the condition of the water as supplied to the premises at 26 Clinton Avenue and at other premises in this vicinity is due for the most part to the decomposition of microscopical organisms and other organic matter in the distributing mains, particularly near the dead ends. The decomposition results in the formation of carbon dioxide gas and corrosion of the mains. This condition is accentuated by the length of time that the water stands in contact with the unlined street mains, particularly in dead-end pipes similarly located to those in Clinton Avenue.

"The Department recommends, as a temporary means of remedying the conditions, that the piping system in and near Clinton Avenue be thoroughly flushed and that a bleeder be installed at the end of Clinton Avenue to permit the continuous wasting of water. When such a bleeder has been installed and is in operation for a period of about two weeks, the Department will cause additional samples of water to be collected from taps in this vicinity to determine the effectiveness of such an installation."

Such a bleeder was installed by the Danvers Water Department by tapping the 6-inch main between 26 Clinton Avenue and the Creese and Cook tannery at the end of the Clinton Avenue 6-inch pipe. A ⅝ x ¾-inch meter, installed in a box meter, was controlled by a valve wheel with the waste pipe emptying into a field. This was regulated so as to empty these two lines entirely at least three to four times in 24 hours over and above the amount used by consumers. The table on page 62 in the columns dated 12/39 shows that this bleeding corrected the iron condition, the dissolved oxygen and the carbon dioxide gas contents to a certain degree.

Study of Situation

It was felt that there were three ways to improve the condition of the water in this area: (1) to lay a new pipe line with a protective lining; (2) to let the water run continuously; and (3) to line the cast iron pipe in place with cement. It was felt that the first procedure would be expensive and wasteful, the second method would only partially correct the situation, and the waste of water, for years, would come to be costly. Therefore, it was decided to line the existing pipe with cement in place, to correct the condition economically and permanently.

Preparing the cement and sand for lining the pipe.—Above, the mixing pan with the cement bags laid out; at right, checking the slump of the sand-cement mix; below, pouring the completed mix into the vertical loading pipe

Correction by Cement Lining

A contract was awarded to Tate Pipe Lining, Inc., of Andover, Mass., for the cleaning of the pipe in place in sections varying from 300 to 400 feet at a time, and the placing of a 3/16-inch lining of cement and sand by the Tate method, developed in Australia. The comparative simplicity of equipment, uniformity of results, and the cost, make this method of interest to water-works officials facing this type of problem. The method may be used in pipes from 3 inches to 12 inches diameter. The cost of the work in Danvers for 8-inch pipe was 69 cents per foot, including all excavation backfill and materials for permitting the entry and exit of the cleaning equipment and lining machine. The base price for the lining alone was 57 cents per foot, the

balance being for excavating for the tees, bends, gates and services.

The Method—Step-by-Step

The step-by-step method of lining the 8-inch main in Clinton Avenue for a section 368 feet long is described in detail. First, the main was shut down and pits excavated to permit removing 4-foot sections of the pipe at each end of the 368-foot section. In one case the trench was somewhat longer, since the same trench was used for cleaning a 6-inch main at right angles to the Clinton Avenue line.

The ends of the main not being cleaned were capped with special caps held in place by Dresser couplings and with a 2-inch threaded opening to permit installation of a 2-inch bypass. Then 3-foot square excavations were made at all corporations for house services, the cocks removed and the main plugged with the same size plugs, care being taken that they did not extend into the pipe. Clean high-pressure garden hoses were used to furnish temporary supplies to each house from the 2-inch bypass, so that no house was without water for more than a few minutes prior to and after the work of cleaning and lining the pipe.

Spring steel rods 7/16-inch in diameter were then pushed through the 368 feet of line to be cleaned, then a 5/8-inch winch cable attached to the end and pulled back through the main. Two units of steel scrapers pressed against the walls of the pipe by flat elliptical springs were then attached to the cable and pulled through by the rear cable from one of the two winch trucks, then reversed and pulled back. These scrapers loosened all the tubercles and other incrusted material in the main so that it might be easily removed by the next equipment.

A set of steel brushes built up in two units and followed by three rubber swabbers each with swivel joints were then attached to the cable and pulled forward through the line to remove the tubercles broken down by the scrapers. When they came to the exit end of the pipe some 3 or 4 cubic feet of black slurry came out of the pipe ahead of the swabbers or squeegees. The brushes and swabbers were then reversed and pulled back through the line, but on the second passage removed much less material than on the first passage through the line.

The bottle-like device is the Tate Lining Machine, which presses a continuous sand-cement tube against the inner wall of the pipe

With the main thus cleaned quite well, two rubber swabbers were attached to the winch cable, followed by a 7⅝-inch "prover" 4 inches long. This outfit was then pulled through the main to test it for any obstructions. The unit was not pulled back but was run through the main in the same direction as the Tate lining machine was to run following it. While the prover was being pulled through the main, the measured quantity of two parts of sand of less than 1/16-inch screen size to one part of portland cement was mixed dry in a steel mortar box five or six times by hand until the mix had the uniform color of the cement. When the prover had reached the far end of the pipe, the men started wetting the batch and mixing it to give an 8- to 8¾-inch slump test, which is the figure used when lining from 350 to 400 feet of pipe. The quantity of the mixture made up was carefully measured to provide a slight excess at the start and to fill the pipe for about 100 feet and to line it and leave an excess of 2 or 3 cubic feet at the exit end.

When the mixing was nearing completion, a vertical loading pipe, with a 90-degree bend at the bottom, was attached with Dresser couplings to the main and held in

(*Continued on page 85*)

ANALYSES OF DANVERS WATER BY MASSACHUSETTS STATE DEPARTMENT OF HEALTH

SAMPLE	COLOR			IRON			CO_2			pH			Dissolved Oxygen % Saturation			Microscopic Organisms			Hardness
	10/39	12/39	10/40	10/39	12/39	10/40	10/39	12/39	10/40	10/39	12/39	10/40	10/39	12/39	10/40	10/39	12/39	10/40	10/40
Middleton Pond	45	47		.25	.18		2	1		6.9	6.5		89	96		2558	490		
Tap in pumping station			43			.28			6			6.5			80			55	25
Danvers State Hospital	48			.20			4			6.55			81			836			
Water-works office tap	45	38	40	.25	.18	.17	1.5	1	5	6.9	6.9	6.5	83	100	76	1133	80	77	21
Tap, 6 Endicott St	37	35	40	.20	.18	.18	3.5	3	5	6.7	6.5	6.7	34	80.5	47	62	43	19	23
Tap, 28 Endicott St	32	33	43	.20	.20	.13	5.0	2.5	0	6.4	6.5	9.0	13	66	36	27	5	2	34
Tap, 63 Endicott St	33	33	43	.20	.10	.14	3.0	2	0	6.8	7.1	9.0	12	47	44	51	0	5	51
Tap, 6 Clinton Ave	42	35	45	.38	.20	.18	4.5	1.5	0	6.7	7.1	9.1	6	55	39	1	12	9	56
Tap, 16 Clinton Ave	55	33	43	.75	.20	.16	5.5	2	0	6.7	6.7	9.1	6	53.5	39	15	8	0	73
Tap, 20 Clinton Ave	47	33	42	.70	.20	.15	6	1	0	6.7	7.1	9.1	7	53.5	60	0	12	10	80
Tap, 26 Clinton Ave	56	33	43	.85	.18	.14	6	1.5	0	6.7	6.7	9.1	6	52	36	11	17	1	100
Bleeder, Clinton Ave		32			.18			1			6.7			53			15		
Tap, Crosse & Cook, beam house	120		45	.50		.12	4		0	7.3		9.1	5		17	20		0	70

An Analysis of Billing

Sewer Service Charges, I

A Discussion Based on Experience in Detroit, Mich., in Distributing the Cost of Building and Operating a Sewage-Disposal System Among the Users

By H. F. Smith
Senior Administrative Assistant,
Detroit Department of Water Supply

THE problem of billing for sewage handling on the sewer rental basis is not *a* problem but a series of problems, in fact, several series of problems. This discussion considers in detail only that series which relates to the practice of billing for sewage handling on the basis of water consumption and reports the experience of the city of Detroit with these problems, rather than discussing each abstractly or as they might apply under all the various sets of circumstances which are brought about by varying local conditions.

Questions Considered

1. What is the most satisfactory basis for sewer service charges?
2. What is the most desirable rate structure?
3. In what form is the sewer service charge to be billed?
4. How are sewer service revenues and receipts to be segregated from water revenues and receipts?
5. Who is to be held responsible for payment of sewer service charges?
6. What is the most satisfactory means of forcing payment of sewer service charges?
7. What effect will adding sewer service charges to water bills have on water bill collections?
8. What is the most satisfactory method for billing users of the sewerage system who obtain all or part of their water supply from a source other than from the city's regular water system?
9. What are the special problems that arise in connection with billing for sewer service rendered to suburban communities?
10. What kind of adjustment should be made for water used in such a manner and for such purposes as to exclude the possibility of its returning to the sewers?

While the questions listed are in most cases general to all cities or jurisdictions which are concerned with the question of sewer service billing, there is such a wide variation in local conditions as related to laws, policies, habits, and available equipment that there is no reason to believe that there can be any general agreement on the answers to all these separate problems.

1. What Is the Most Satisfactory Basis for Sewer Service Charges?*

There are several different bases available, the most frequently used of which are:

a. A uniform charge to each user of the system
b. The number of sewer connections
c. The type of property served
d. The number of plumbing fixtures
e. Metered water consumption
f. Metered sewage

It appears to be quite generally accepted that metered water consumption is one of the most satisfactory yardsticks of measuring sewage flow. Detroit officials were in agreement on this point and because Detroit's water system is 100 per cent metered, water consumption was adopted as the base for sewer service charges*, with the understanding that special consideration would be given to cases where a private water supply is involved, and to cases where all or part of the metered water is not discharged into the sanitary sewer.

2. What Is the Most Desirable Rate Structure?

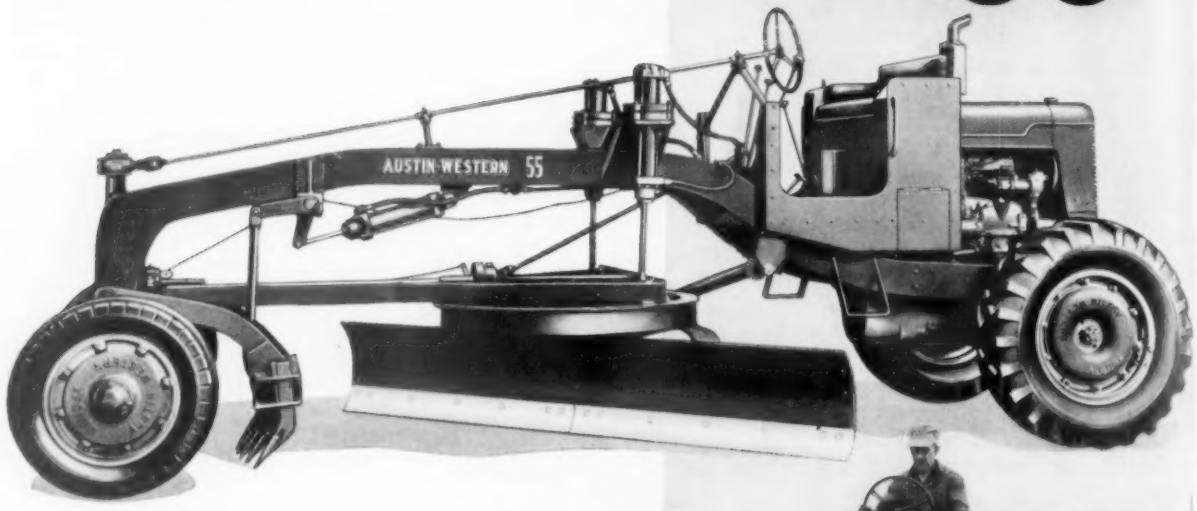
Assuming that metered water consumption is to be the base, there are three sewer service rate structures from which a choice may be made:

a. A uniform rate per thousand cubic feet of water consumed
b. A step rate
c. A uniform per cent of the water bill

Detroit adopted the uniform rate per thousand cubic feet for the reason that the entire charge is for removal and treatment of sewage that is picked up by the interceptors; consequently, the cost of removing and treating any given unit of sewage is practically identical with the cost of removing and treating any other unit. There is, for example, no difference between the cost of handling one million gallons of sewage contributed to the system by one large contributor, and the cost of handling the same quantity contributed to the system by 1,000 contributors who contributed 1,000 gallons each. The factors involved in a water-rate study are entirely different in many respects. Certainly, no one will contend that it does not cost more to deliver 1,000 cubic feet of water to each of 1,000 customers than it does to deliver the total amount to one large customer. That is the reason for steps in a water rate. These reasons not being present in the Detroit sewer service rate problem, it would be difficult to justify the use of the "step rate" or the "per cent of water bill" plan.

* The author's original paper used the term "sewage-disposal charges," for which we have substituted "sewer service charges" as a term more in harmony with the service rendered in removing and treating the sewage. The charges, however, are used solely for financing the intereceptors, treatment plant and effluent conduit to the river.—Editor.

Meet the NEW A-W "55"



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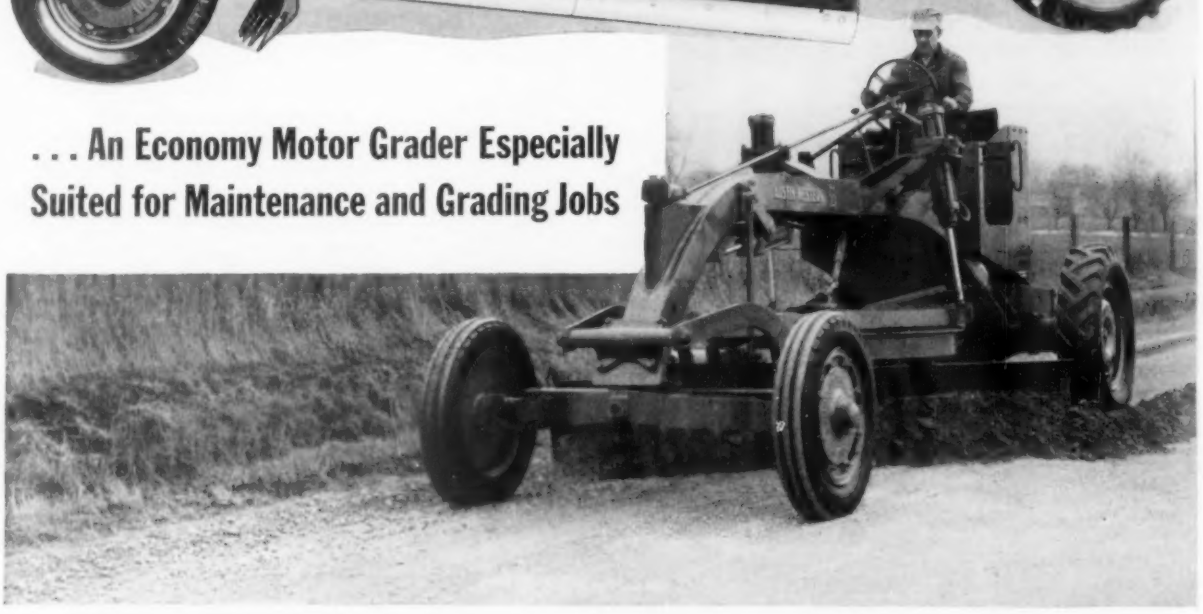

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During April we hope you will remember to mention THE AMERICAN CITY.

3. In What Form Is the Sewer Service Charge to Be Billed?

The available choices are:

a. Separate bill entirely independent of water bill
b. Separate bill attached to water bill
c. Billed as a separate item on the water bill
d. Included in the water bill

There are advantages and disadvantages in each method. We feel, however, that the advantages of separate bills or separate items on the water bills are insufficient to justify the additional expenses caused thereby.

A cost study of the various procedures disclosed the fact that it would cost the Detroit Water Department an additional sum of approximately $40,000 a year to show the sewer service charge as a separate item on the water bill, or an additional sum of about $75,000 a year to render separate bills; whereas, under the adopted plan of including the sewer service charge in the water bill, there is not one cent additional expense involved.

4. How Are Sewer Service Revenues and Receipts to Be Segregated from Water Revenues and Receipts?

Under the separate bill plan, separate ledger records are usually maintained, thereby establishing an entirely independent set of records for sewage collection and treatment; consequently this question does not arise. Under the "separate item on bill plan" there are several satisfactory methods. These are, of course, dependent upon the kind of customer accounting system used by the water department.

Where the sewer service charge is included in the water bill, there is a real problem. Here is how Detroit solved it. A glance at the rate structure shown below will help to clarify this picture.

It will be noted that the rate schedule shows the water rate separately, the sewage-disposal or sewer service rate separately, and then the combination rate, which is, of course, the sum of the two. The customer service staff think and talk in terms of two separate rates; whereas, the billing and bookkeeping staff think only of the combined rate. Their operations have not changed one bit. The addition of the sewer service charge to them is simply a change in the water rates. It should also be understood that Detroit's regular water billing control system has always given the exact amount of water billed, both in dollars and cubic feet per billing unit. These unit totals are summarized to district, daily, and monthly totals; consequently, there is available for any given period of time or geographical subdivision of the area served by the system, an accurate statement of the amount of water consumed. In view of the fact that the sewer service rate is a flat 11 cents per thousand cubic feet of water consumed, it is only necessary to apply the sewer service rate to the total amount of water billed for any given period or district to determine the exact amount which was charged for this service. This amount deducted from the total amount billed does of course give the amount billed for water.

DETROIT WATER AND SEWAGE-DISPOSAL RATES
Effective on All Bills Rendered on and after June 19, 1940

Rate Steps		Water Rate Per M Cu. Ft.	Sewage-Disposal Rate per M. Cu. Ft.	Total Rate per M.Cu.Ft
Consumption Charge—				
First	10,000 cu. ft. per mo.	78c	11c	89c
Next	90,000 " " " "	60c	11c	71c
All over	100,000 " " " "	48c	11c	59c

Monthly Service Charge

Meter Size			
⅝"	$ .24	.....	$ .24
¾"	.36	.....	.36
1"	.72	.....	.72
1½"	1.44	.....	1.44
2"	2.40	.....	2.40
3"	3.36	.....	3.36
4"	4.32	.....	4.32
6"	7.20	.....	7.20
8"	11.04	.....	11.04
10"	15.84	.....	15.84
12"	18.72	.....	18.72
16"	30.24	.....	30.24
24"	53.28	.....	53.28

Service charge is added to consumption charge and shown on the bill as one item.
Minimum bill.....$1.50 per quarter

Fire Line Rate

Consumption charge plus one-third service charge.

This bill is for water and sewer-disposal service to the premises designated on the face of the bill, and by virtue of the Detroit City Charter and Ordinances is a lien against the property served.

An entirely separate set of general books is kept for sewage-disposal records in accordance with provisions of the state enabling act and the city ordinance. Sewer service billings and water billings are entered to the revenue accounts in their respective ledgers, while the total of the two is posted to accounts receivable in the water ledger with an entry to accounts payable in an amount equal to the total sewer service billing, and a corresponding entry to sewage-disposal accounts receivable. All cash receipts are therefore credited to water accounts receivable. This method of accounting was adopted in order to avoid the necessity of segregating cash as received. Segregation is therefore made on the basis of revenues rather than cash receipts but the two are brought into exact agreement in the following manner:

The Department of Water Supply knows from past experience that it is eventually going to collect all but about 0.2 per cent of the amount it bills; consequently, it is willing to, and does, withdraw cash each month from the water fund in the amount of the total sewer service charges billed for the month, and deposits such amount to the credit of the sewage-disposal fund with the understanding that any delinquent balance later written off as uncollectible will be analysed to determine what part is for water and what part for sewer service, and that the amount for sewage disposal will be transferred from the sewage-disposal fund to the water fund, thus bringing the segregation of funds which was made on the basis of revenue into complete and exact agreement with segregation on the basis of cash receipts. It may be pointed out that this plan causes the Water Department to make advance payments to the sewage-disposal fund and to a certain degree that is true, but if this procedure should for any reason become undesirable, payment can be delayed a few days, so that on the average there would be no advance payment. In any event, we think that this point is immaterial when considered with the fact that this method of billing means a net saving of about $75,000 a year to users of the sewerage system.

5. Who Is to Be Held Responsible for Payment of Sewer Service Charges?

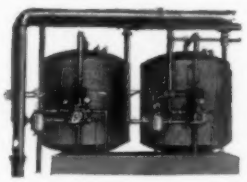
It is of course important to determine in advance who is to be held responsible for sewer service charges and what method is to be used to establish such liability. If the charge is based on water consumption, the responsibility for payment of the sewer service charge should be the same as the responsibility for payment of the water charge and established in the same manner. If water is furnished on an individual contract basis, the contract should be revised to include sewer service

A Tale of Two Cities

—and what they did about HARD WATER

Bicknell, Ind.

This progressive city decided to do something about the 24 grain hardness of its water. So it installed a Permutit* Automatic Zeolite Water Softening plant. Now the whole city enjoys soft, iron-free water. The equipment is compact and automatic, leaving operators free for other duties.



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WATER CONDITIONING HEADQUARTERS

charges. If, by city charter or ordinance provisions, water charges are made a lien against the property served, then the sewer service ordinance should provide for making sewer service charges also a lien against the property, and care should be taken to see that the provisions conform in all essential details. In Detroit, both water and sewer service charges are made against the property served. Such charges are held a lien against the property by virtue of a state law and city ordinance.

ACKNOWLEDGEMENT.—A paper presented at the 1940 Public Works Congress of the American Public Works Association in Detroit, Mich.

(To be continued in the May issue)

From Dust Preventives to Tar Road-Mix

Low-Cost Paving in Ann Arbor, Mich., Described in Detail with Costs for Every Step

By GEORGE H. SANDENBURGH
City Engineer

FOR several years prior to 1927 the city of Ann Arbor had been using a dust preventive which had to be applied every year. This dust preventive gave no permanent benefit and cost the city about $20,000 per year. In 1927 the Board of Public Works concluded that there must be some cheaper way of eliminating the dust nuisance and decided to experiment with a bituminous material. A fairly well-graveled street, with a sand subgrade, approximately half a mile in length, was selected for the experiment. The gravel was well compacted and free from soft spots. The bituminous material selected was Tarvia B. The surface of the gravel was swept with a rotary broom to remove as much dust and loose material as possible. Then Tarvia B was applied to the surface in the amount of 0.25- to 0.33-gallon per square yard, and the street closed to traffic for 24 hours to give the tar time to penetrate into the gravel surface. Following this first application of tar after 24 hours had elapsed, a second application of 0.25-gallon of tar per square yard was applied. Pea pebbles in the amount of 16 to 20 pounds per square yard were applied immediately following the second application of tar, and the street was then opened to traffic.

The above described surface or carpet coat treatment produced a bituminous mixture ½- to ¾-inch in thickness costing 12.8 cents per square yard. This pavement, constructed in 1927, was given a seal coat in 1928 and 1930. The seal coats cost 6 cents per square yard, making the total cost of the pavement to date 24.8 cents per square yard. The pavement is in good condition today. It will be given another seal coat in 1941.

Tar Road-Mix

The results of our experimental work were so satisfactory that in 1931 we entered on a large program of low-cost pavement construction. The streets built in 1931 were all surface treatment but three, which were constructed by the road-mix method.

The road-mix method consists of scarifying the existing street surface to a depth of 1½ to 2 inches, then applying 0.5-gallon of tar per square yard and mixing the tar and road material thoroughly by means of power graders. The mixing is continued until a uniform color is obtained. Depending on conditions, the tar and road material will have to be turned over by the power grader from six to twelve times. After the first application of 0.5-gallon of tar is thoroughly mixed with gravel, the mixture is spread out evenly over the street and given another application of 0.33-gallon of tar per square yard, and the mixing is repeated until the mixture of tar and gravel has a uniform black color. The mixture is then spread out evenly over the street and rolled with a 5-ton roller. Following this, the street is opened to traffic for a period of two to four weeks. A seal coat consisting of .25-gallon of tar and 16 to 20 pounds of pea pebbles per square yard is applied at the end of this period, which completes the pavement for the first year. The following year another seal coat is applied. The completed pavement consists of the road-mix portion plus a seal coat the first year and another seal coat the following summer.

Improved Road-Mix

During the first few years we did not add any new material to the road surface before the application of tar. The existing gravel surface was scarified to a depth of 1½ to 2 inches, and this material when mixed with the tar provided the wearing surface. After a few years we found the cost of these pavements so reasonable that we began to improve our methods of construction. Where a street surface, after scarifying, showed too fine or too coarse material, coarse or fine material was added to provide a well-graded aggregate.

At the end of the season when costs were computed, we were very much surprised to find that the cost of road-mix was only a fraction of a cent more per square yard than that of surface treatment, the costs

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being road-mix 13.5 cents per square yard, and surface treatment 12.8 cents per square yard. The cost figures showed that the cost of picking up the dust and loose material swept from the surface of the gravel street was nearly as much as the cost of mixing by the road-mix method. The costs being nearly equal, and the road-mix giving a wearing surface 1½ to 2 inches in thickness, compared to ½- to ¾-inch in thickness for the surface treatment, we adopted the road-mix method as standard and have used it from 1932 to 1939.

Cost Data

In 1940 our season's work of approximately 30,000 square yards was contracted. The mixture was Michigan State Highway Department specification oil aggregate.

From 1931 to 1939 inclusive we have built 628,929 square yards of low-cost bituminous pavements at a cost of $157,126.31, or an average cost of 24.98 cents per square yard over the 9-year period.

The total cost of maintenance of the 600,375 square yards of low-cost pavements from 1932 to June 30, 1940, has been $51,126.26, or an average cost of $0.0085 per square yard over the 9-year period.

The yearly cost of maintenance is given in the following table:

It will be noted that the cost of maintenance jumped from $2,950.47 in 1935-36 to $5,952.00 in 1936-37. This increase in cost is due to the fact that in 1936-37 we decided to resurface all low-cost pavements every five or six years, depending on their condition, since we have learned by experience that resurfacing an entire street before a break-up is much cheaper than patching local break-ups. A seal coat or resurfacing will prevent breaking-up of the pavement if done in time. So we have adopted this policy of maintenance. Streets built in 1933-34 were resurfaced in 1938-39, etc. This comparatively high maintenance cost also included paving streets that did not have the proper base, and surface treatment was used on the majority of the streets the first year instead of road-mix. However, a surface treatment on a well-compacted, well-drained gravel subgrade will give

ANNUAL MAINTENANCE COSTS, ANN ARBOR, MICH.

	No. of Miles Maintained	No. of Sq. Yds. Maintained	Cost of Maintenance	Cost per Sq. Yd.
1932-33	8.61	151,561	$1,190.11	$0.0126
1933-34	18.40	325,715	2,284.85	0.0070
1934-35	22.93	405,550	2,394.88	0.0059
1935-36	25.04	442,992	2,950.47	0.0067
1936-37	28.30	498,791	5,952.00	0.0119
1937-38	30.75	543,203	13,157.49	0.0242
1938-39	32.56	571,851	13,355.99	0.0233
1939-40	34.10	600,375	9,120.47	0.0152

excellent service. We have numerous surface treatment low-cost pavements that were built in 1931 that are still in very good condition and will give many more years of service. In other words, the success of the wearing surface depends upon the base under it. For city work, however, I can see no reason for surface treatments inasmuch as road-mix is better and does not cost any more.

Costs Dropping

You will note that maintenance costs dropped for the year 1939-40. This is explained by the fact that all the earlier pavements have been resurfaced, and the later pavements, having been built better and on better bases, do not require as much maintenance.

The following table gives the number of square yards of resurfacing and the year in which the resurfacing was done.

1935-36	15,768	square yards
1936-37	24,794	" "
1937-38	129,116	" "
1938-39	160,373	" "
1939-40	88,458	" "

We expect the maintenance costs to drop still more because the pavements built in the last four years have been on better bases, and where the material on the street did not have the proper grading, new material was added.

Our present practice calls for at least 5 inches of gravel below the wearing surface, which averages 2 inches in thickness. All streets are now checked for thickness of gravel before being paved, and if we find there is less than 5 inches, the existing roadbed is removed and 7 inches of new gravel applied. The gravel is stabilized and compacted thoroughly before the wearing surface is built.

COSTS

MATERIAL

Tar	$0.0995	per gal.	F.O.B.	Ann	Arbor	
Pebbles	1.45	per cu. yd.	"	"	"	
Pea pebbles	1.45	"	"	"	"	"
Gravel	1.25	"	"	"	"	"

EQUIPMENT RENTAL RATES

City-owned trucks (2-yd.)	$0.50	per hr. without driver
Private-owned trucks (5 yd.)	2.25	" " with "
Graders	1.00	" " without "
Roller	.66	" " " "
Tractor	.50	" " " "
Distributor	2.76	" " " "

LABOR RATES

Common labor	$.56 to $.60 per hr.
Equipment operators	.66 per hour

The present cost per square yard of low-cost road-mix pavement, including first year's seal coat, is itemized as follows:

Tar	11.316 cents
Stone and pebbles	3.703 "
Pea pebbles	.986 "
Miscellaneous	.373 "
Labor	6.013 "
Equipment rental	4.682 "
	27.073 "

The cost of the second year's seal coat per square yard is itemized as follows:

Tar	$0.0328
Pea pebbles	.0079
Miscellaneous	.0011
Labor	.0105
Equipment	.0026
	$ .0539

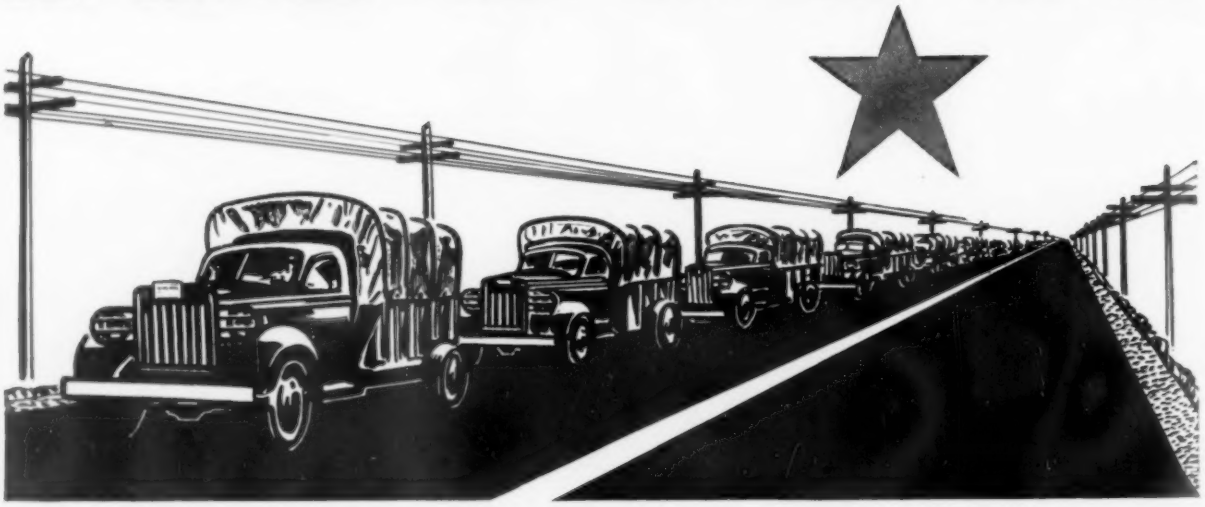
The second year's seal coat is considered part of the original cost, so for 1939-40 our cost was 27.073 + 5.39, or 33.463 cents per square yard.

Conclusion

We are very well satisfied with the results of our low-cost pavements. Had they not been built, we should have spent more for dust layer during the last nine years than what the low-cost pavements have cost. And, in addition, we have dry streets in the fall, winter and spring, and dustless streets in the summer time.

These low-cost pavements are not only proving successful on residential streets but are just as successful on our heaviest-traveled industrial streets. All our streets along railroad sidings have this low-cost pavement and are giving good results.

AMERICA SWINGS INTO ACTION



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Locating Industrial Defense Housing Projects

By CARL FEISS

Consultant, Virginia State Planning Board

HOUSING heretofore has not always been located logically. Decisions have been based largely on the ease of acquisition of land and its cost. Some consideration is usually given to the conditions of the surrounding neighborhood and to topography and subsoil conditions. An alert housing authority checks on available school facilities, recreation and shopping possibilities. Public utilities, such as sewers and water, transit and transportation, have played varying roles in the weighting factors influencing location decisions. Adequacy of zoning and planning provisions has rarely been sufficiently considered.

No matter how temporary you may consider a project, no matter how short you may deem this national emergency to be, every project that is built is a function of governmental finance. It must be serviced by utilities; it must be afforded police and fire protection; it must be supplied with public health services and with educational and recreational services, in addition to which transportation costs must be met, either through bus or street-car facilities or by supplying space on existing streets or new ones for additional automobile traffic loads. No matter how much the Federal Government subsidizes the local authority in the construction of units, the local government must foot a correspondingly high bill, and the local housing authority, an agency in the public service and in service of the local government, has among its many responsibilities the important one of ascertaining that a project is so well located as to cause the slightest possible drain on the municipal treasury and the public's purse.

Sites to Be Avoided

Both permanent and temporary war industries may be located in urban, suburban, small town or rural areas, but in no case does the housing, whether financed by private or public funds, have to be immediately adjacent to the industry. In fact, in most cases it would be very unwise to locate it adjacent to the industries. The most obvious examples, of course, are those of the industries manufacturing inflammable and explosive materials. Recent explosions in New Jersey have testified to the wisdom of locating the workers' residences several miles from the plants. There are other types of dangerous industry besides the explosive and chemical. It would be unwise to locate a housing project immediately adjacent to an airport or a plant manufacturing airplanes, with its attendant testing grounds.

Another important factor to be considered is the relation of a project to the smoke and noxious-fume belt caused by a heavy industry. If the housing is intended for permanent use, special care should be taken to relate the residences so that they are on the windward side of the heavy industry and where possible are above the belt of smog created by the industry. Since most heavy industry will be located immediately adjacent to water and rail transportation, it is to be hoped that the housing will be located at a high enough elevation to be above and away from not only the smoke but dampness or danger from flood and the noise of industry and transportation.

Not Too Near—and Not Too Far

The separation of the homes of the workers from the locations of employment should simplify rather than complicate location factors. It provides the defense planner with a greater flexibility than heretofore and in larger cities he may be in a position to avail himself of existing transportation systems, schools and public services which may not be immediately adjacent to a desirable industrial area. In the smaller town, where transportation facilities are limited, bridge and highway construction may play an important part in the housing program. In the light of experience with housing workers in the last war, it is apparent that one of the most important problems *is* the stabilization of workers in each community. Unrest due to poor accommodations, lack of houses in decent residential areas, and poor schools, contributed as much to the general migration of the workers as any other factor.

In terms of time, the worker should not have to spend more than one half-hour a day in travel. Even this involves nearly a week a year spent in moving from home to plant. Traveling at the average rate of 25 miles an hour, by a public conveyance or a private car, a man may cover 6¼ miles in 15 minutes. If the plant is well located in a community, it is perfectly possible to adjust the housing locations within a 6-mile radius with more flexibility and less hardship on the community than one would think at first glance.

In the smaller town it may be possible for a man to walk to work in fifteen minutes. However, this will be inadvisable in sections of the country where there are extremes of temperature or weather and where the worker may be engaged in heavy industry.

Community Planning Essential

No war housing can have permanent value unless it is designed as a community in itself or as part of an existing community. If it is large enough to be designed as a community with schools and shopping center, the services of competent town planning consultants should be obtained. In all cases consultation with planners familiar with local problems is advisable, and the services of state and county planning agencies could be invaluable in the primary location decisions. Those communities which profited from the advice of experts during the last war have survived economically and structurally, while many shoddy private enterprise projects built without benefit of technical assistance have disappeared. The planning technician is in a position not only to lay out the houses, but to advise on their location in relation to street planning, topography, utilities, location of public buildings, transportation, recreation, legal protection, and a multitude of factors which compose a successful community. In collaboration with the planning expert, architects and other technicians, it would be possible to tie each expenditure for war housing into the housing needs of each community. Thus, while meeting a problem of national emergency in a practical and forthright way, the housing authorities would be participating in the nation's long-term program for rehousing and community improvement.

—Excerpts from a paper presented at a recent conference of the National Association of Housing Officials.

Street Maintenance Costs Go Down

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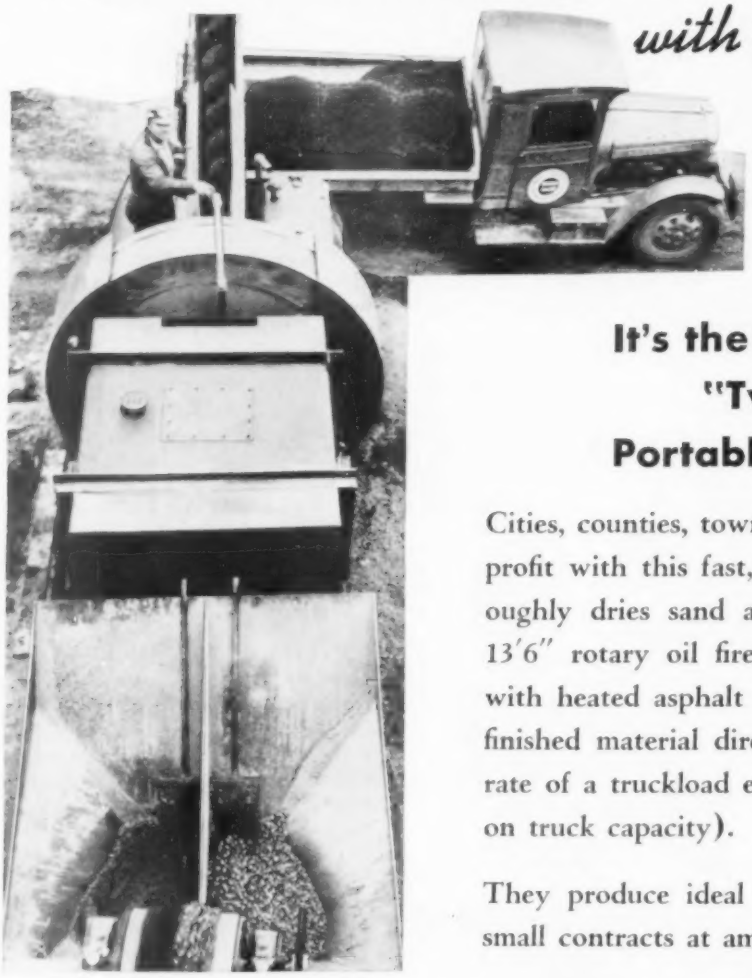

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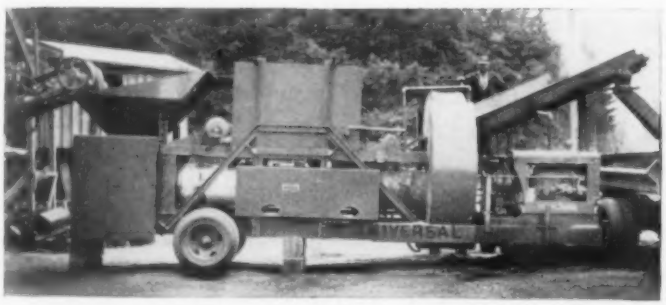

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Local Government Is News

Municipal Housekeeping and the Citizen

By PHILLIPS BRADLEY

FIRE, police, water, sanitation, schools—these are the services the citizens see in action most often. Parks, playgrounds, highways—these services are as vital to the community as any, and are often taken for granted. The city's civil servants run all these services and many others. How often do the taxpayers and indeed all the citizens hear about the jobs these civil servants are doing, how they are selected, what the policies they carry out are—and why? The biggest housekeeping job in every community is the city's government. What can we do to improve our citizens' knowledge of—and so their interest in—its housekeeping program?

So far in this series on "Local Government Is News" some ideas for improving the citizen's knowledge of his community's housekeeping—in terms of taxes and budgets—have been suggested. The consolidated annual report of a city or town is of course the citizen's first by-line of information about his community's housekeeping. Is it not possible, however, to break down the city's or town's housekeeping picture into those segments which are likely to be most interesting to various members of the community family?

Many cities and towns are finding it a valuable investment in public relations to present individual aspects of their housekeeping job in departmental reports, both annual and special, by broadcasting these breakdowns of municipal activities. They help to keep their citizens informed—and interested in—the problems and programs of their city's government. How can these reports be made most useful as sources of information and blueprints of policy—which will help the citizen to appraise the effectiveness of his city's services?

The editors of THE AMERICAN CITY will appreciate comments and suggestions for this department.

First of all, it will increase interest in such a report if an attractive cover design is developed. If the report is printed, a two- or three-color cover is a real attention-getter. A picture of one of the service buildings, or activities, or a financial project, or even a cartoon, will attract reader interest.

Second, a brief introduction on the title page of what this report deals with—and why—will focus the reader's attention on the significant points. A good example of this kind of focusing is to be found in the current annual report of the Cincinnati Department of Purchasing:

> **The purpose of this report is threefold. Primarily, this is a report of the Purchasing Agent to the City Manager, covering the activities of the Department of Purchasing and its subdivisions, with particular emphasis on the statistical data and the work done during the past year. Secondarily, the report shows the interested taxpayers how their tax dollar has been expended. And finally, due to the great number of requests from various cities, organizations, and individuals, for miscellaneous information regarding our department, this report covers our activities in general.**

Such a statement as this tells the reader at a glance what he is likely to find in the report and why it is important. It gives him a guide to what his city is doing in a given field.

Such separate annual reports do not necessarily need to be printed, nor do they necessarily have to include all the details and records of the department's work for the year. They should rather give a summary picture of organization, activities and policies which bring out the salient features of the year's work. The Cincinnati report noted above is less than 9 pages long.

When annual reports are not printed —or even if they are—a mimeographed report attractively processed fills the bill. Here, too, imagination and artistry can go into an effective cover design. Hardly any community is so small as not to be able to afford this kind of public information about its activities.

This same sort of emphasis of graphic presentation can be used in many directions. As noted in the March number of this series in THE AMERICAN CITY, many departments are issuing special reports, especially on taxation and budgets. These items offer a further way of making the activities of a single department, as well as of the city as a whole, understood and appreciated by the citizens. An interesting example is the tax dollar chart which

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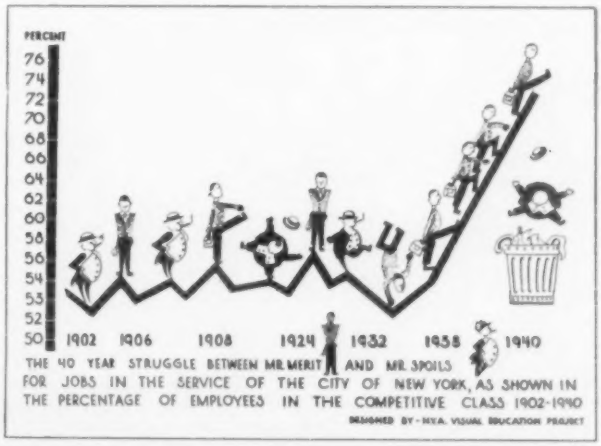
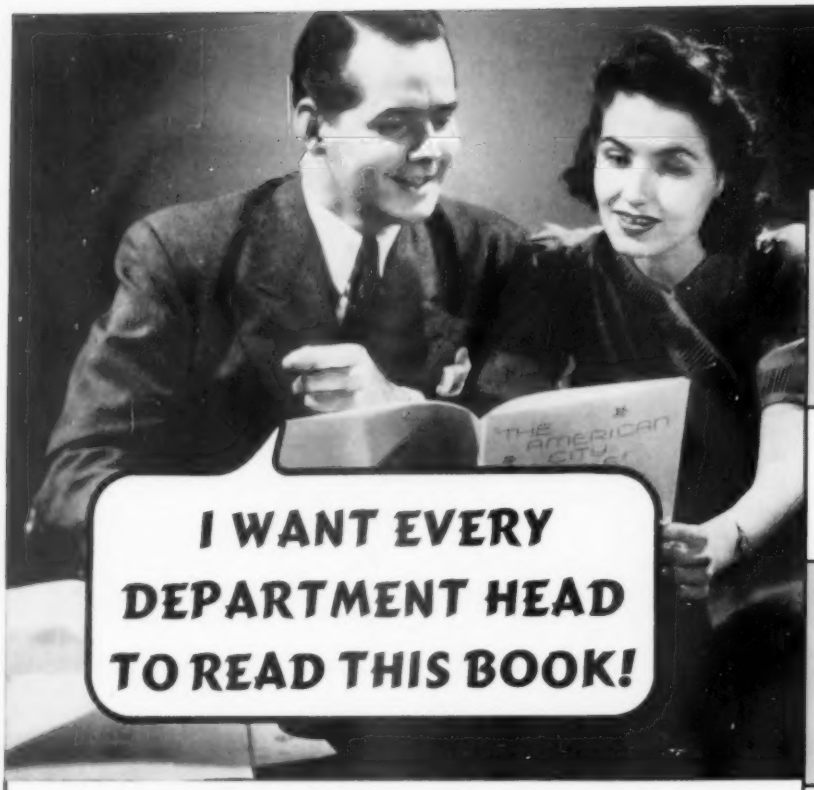
From the Title Page of a Cleveland Report



Title Page and Page 5 of Special Report Recently Issued by the New York City Civil Service Commission, Telling the Story in Graphs and Photographs, and in Popular Language



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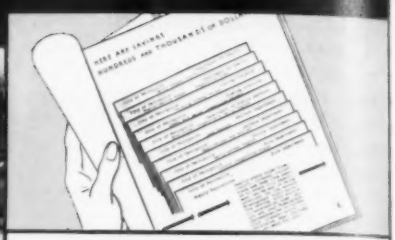

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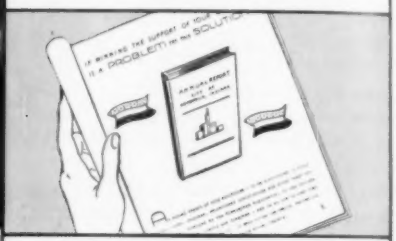

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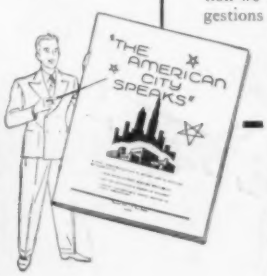

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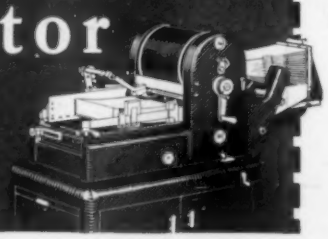

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is being printed on the back of tax bills by Kansas City, Mo. Such breakdowns aid the citizen to understand how his money is being used.

Take, for instance, the highway or public works department. Here the annual appropriation is used in many different ways, all of which the citizen appreciates but seldom understands in terms of the division of the money between different services. Many other expenditures in this area are those for street construction, street maintenance, watering, snow removal, and perhaps such additional items as lighting. Here many interesting insights can be given the citizen as to the problems which the superintendent or commissioner and his staff have to face and the policies they work out to meet the problems.

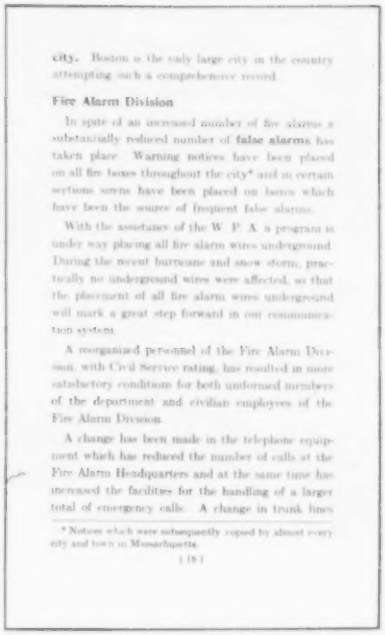
Take as a current example the mid-March snowstorm in New York City. There was a 6- to 10-inch snowfall. By a careful reading of weather forecasts, the Commissioner decided to take on no extra men and trucks for rapid clearing—on the expectation that Old Man Weather would help the regular snow-removal force. Results justified the decision. The city was saved $1,500,000, and much favorable newspaper publicity resulted. A graphic and objective story about such a decision in an annual or special report—preferably the latter—would be a useful investment in reminding or informing the citizens of problems and how they are met efficiently. A guess on the weather is at best a guess. Understanding why and how such guesses are made—in this and other fields of municipal administration — will mitigate public criticism when some guesses do not turn out so happily.

There are many other kinds of special reports which are worth a department's time and effort in preparing. Five-year records of accomplishments and statements of program are one way of keeping citizens alive to the progress of their city's services. Often an annual report at a 5-, 10- or 25-year period can be used as a special means of highlighting progress. Often, too, it will turn out to be useful to issue special reports covering significant periods of municipal activity. Comparisons by chart and diagram, and pictures of "before and after" projects, are helpful ways of making citizens government-conscious. Samples will indicate various ways in which departments are now trying to utilize annual and special reports for developing citizen-awareness.

The Fire Commissioner of Boston, Mass., has issued, for the first time, a report "to the Department"—which is also a report to the citizens. In a small, attractively bound and printed brochure of 27 pages, the Fire Commissioner tells the story of the Department's work for the year in a friendly, conversational style. It covers such items as personnel in its various aspects of size, promotions, pensions, service records, vacations, and recreational activities; housing; apparatus; fire college; current activities, and conclusions. A summary financial report in the form of a 3-page digest under two headings, "Savings — you have hoped to make!" and "Budget—items in which increases have taken place," tell the citizen at a glance what his fire service costs and why. A few illustrations of departmental work and a sample fire district record of calls answered tell much more graphically than words what the fire department has to do and how it does it.

The Kansas City, Kans., Board of Public Utilities showed, in 1939, a special report, "25 Years of Service" of the municipal water, light and power plant. Aside from pictures of individuals, there are in its 71 pages 30-odd pages of photographs and charts illustrating the progress of the plant since its establishment. Here again, the text is informal—and so more interesting to the busy citizen who wants to know about a quarter-century of municipal progress.

Cleveland's Department of Public lic Utilities has showed (in 1937) a somewhat similar illustrated report on "Cleveland's Municipally Owned Public Utilities." The title page is itself a nice illustration of making citizens aware of their public utilities service.



city. Boston is the only large city in the country attempting such a comprehensive record.

Fire Alarm Division

In spite of an increased number of fire alarms a substantially reduced number of **false alarms** has taken place. Warning notices have been placed on all fire boxes throughout the city* and in certain sections sirens have been placed on boxes which have been the source of frequent false alarms.

With the assistance of the W. P. A. a program is under way placing all fire alarm wires underground. During the recent hurricane and snow storm, practically no underground wires were affected, so that the placement of all fire alarm wires underground will mark a great step forward in our communication system.

A reorganized personnel of the Fire Alarm Division, with Civil Service rating, has resulted in more satisfactory conditions for both uniformed members of the department and civilian employes of the Fire Alarm Division.

A change has been made in the telephone equipment which has reduced the number of calls at the Fire Alarm Headquarters and at the same time has increased the facilities for the handling of a larger total of emergency calls. A change in trunk lines

* Notices which were subsequently copied by almost every city and town in Massachusetts.

[18]

A Page from the January 2, 1941, Report of the Fire Commissioner of Boston

The welfare services of a city are fertile sources for developing citizen awareness. Parks, playgrounds, and other recreational

(*Concluded on page 95*)

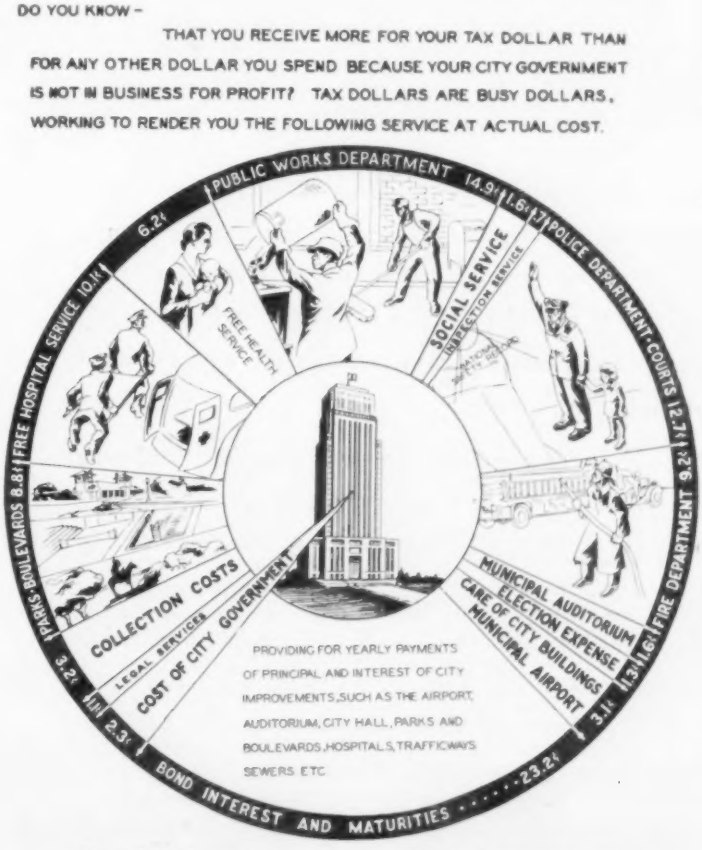

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Chart Printed on the Back of Tax Bills by Kansas City, Mo.

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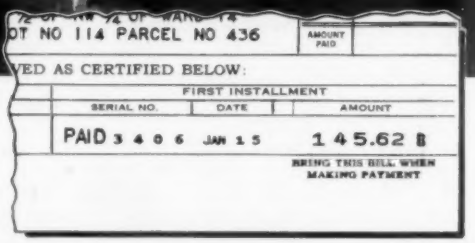

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Good Transit Is a City Government Obligation

MUNICIPAL and utility services furnished in an urban center on a community-wide basis, such as policing, water supply, sewerage, fire protection, lighting and mass transportation, are generally supported in one of two ways. Either they are financed through taxes based upon property values or by charges based in some measure on the quantity of the service consumed. The objective aimed at, but never perfectly attained, is that anyone located in any place in the community can obtain uniform service at the same unit rate.

Were any other method followed and the charge for the services related to the cost of furnishing them, heavily congested areas would be unduly favored and outlying sections penalized. Thus the city would develop a centripetal force tending towards more and more congestion in the already crowded sections, with consequent stifling of orderly growth and expansion.

Consider the situation with respect to municipal services financed from taxes. The most valuable property is in the central district and, since the tax rate is uniform, that district carries a very large share of the cost of government. Outside of the downtown wards in our large cities, there are very few that directly pay their own way—though they add, of course, to the taxable values of the business sections. Although the owner of a lot in the downtown district pays far greater total taxes than the owner of a similar-sized lot in the suburbs, an attempt is made to give to both the same services and governmental attention. Were the "unprofitable" sections of the community to be amputated from the whole, there would follow a policy which, when carried to its ultimate, would reduce the city to the downtown congested area, and if followed out to the theoretical limit, only the higher priced property in the area would remain.

In rendering the described community services, it has come to be accepted that, as in the case of fire insurance, the "good" part carries the "bad." This is as it should be, and is the only situation that can exist if rates and services over the community are to be uniform and reasonable.

In the provision of essential utilities such as water supply and mass transportation, while the unit charges for similar quantities are uniform, the individual's bill for the services is usually related to the quantity of the commodity consumed, whether rendered by private concerns or as municipally owned utilities.

Take Water

Any resident can buy a thousand gallons of water at any place in the city at the same price as any other user, but this water does not all cost the same to produce and deliver. Some lines yield a higher amount of revenue on capital investment and operating cost, and there are others that do not earn their entire cost. Furthermore, the added cost of producing additional quantities of water is not so great as the price charged for a given amount. Assume that the average cost of furnishing water is 15 cents per 1,000 gallons. If the demand is reduced by, say, 10 per cent, there will not be a corresponding reduction in the cost of furnishing the smaller volume of water, because investment costs and most of the operating costs will remain the same. Thus the elimination, on the basis of "unprofitability," of water lines on which the revenue does not meet the average cost of production but which, nevertheless, exceeds out-of-pocket costs of furnishing the service, would only have the result of adversely affecting the cash results of the activity.

Mass Transportation

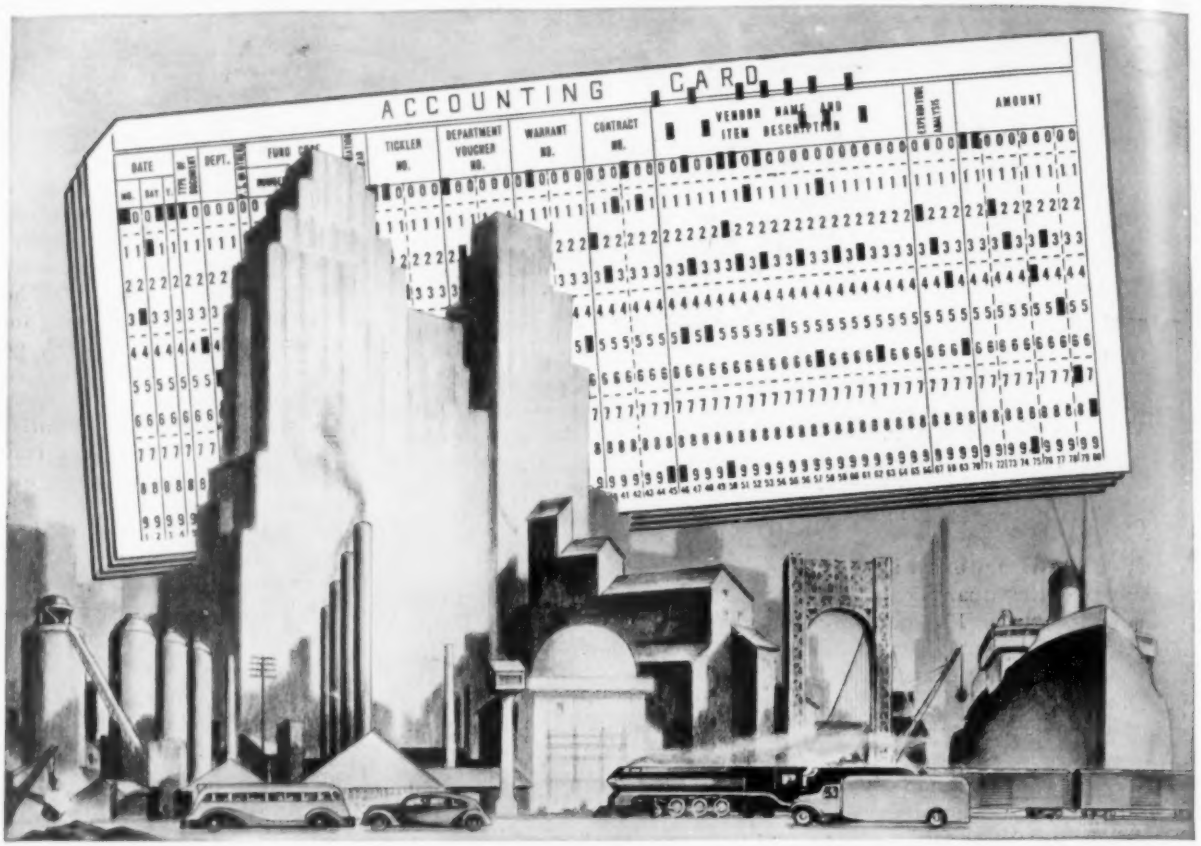
The various routes which make up a community-wide mass-transportation system are, in their essential elements, similar to the water lines serving that community. The transportation lines converging on the congested district earn large revenues per mile, and a part of these earnings is used to support the leaner lines in the suburbs. Often the same line or route may be profitable at one end and unprofitable at the other.

Feeder lines often do not return a profit; but, on the other hand, their recorded earnings do not completely reflect their contribution to the system.

A route which cannot earn expenses would probably be abandoned if a decision were to be made by an accountant. But the financial gain would not be worth the public resentment in the abandoned districts which had been made attractive by the public transportation facilities.

If a route fails to earn depreciation after meeting out-of-pocket expenses, including taxes, let alone a fair return on the investment, it does not follow that the route should never have been started. Transit, like other major public services, must be rendered to citizens in all the districts of the municipality.

Where the municipal government owns and operates the transit system, as in Detroit and Seattle, it is expected that the profitable lines will pay the deficit of the sparsely used lines, and in the possible event that the unprofitable lines prevented the entire system from making expenses, then the system deficit would have to be made up out of other resources, such as taxes. There would be no thought of abandoning the outlying lines. Where the transit system is privately owned,—as is usually the case,—there is an obligation on the city government to recognize that a private enterprise must pay its way or deteriorate and eventually go on the rocks. Far from an asset to the city, a city-wide in-



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dustry which is consistently losing money is a persistently troublesome and even a dangerous element in the community. Whether a higher fare should be allowed, or fare zones should be set up, or a different type of service should be installed, measures should be taken to find out what is the matter, and the right medicine should, if possible, be administered.

It must be borne in mind that, unlike the unprofitable department in a store, most of the more sparsely patronized or long-haul lines cannot be discontinued. Here and there a line can be abandoned or moved over a few blocks; but, by and large, lines are where they are because there is sufficient social need for them.

The basic question to be answered, therefore, is not: "Will this particular service to such a district pay within itself?" but "Considered as part of the community activity, will it contribute essential service to a plant operated on a community-wide rate base?"

Extensions of community-wide utilities operated on the basis of reasonable and uniform rates under governmental regulation are not made on the basis of meeting all charges as soon as the extension is made. A need for the service must have been evident and demanded; otherwise the investment would not have been made. Even though such a route cannot justify itself as a revenue producer, it does, as part of a city-wide system, contribute to the general benefit of the community as a whole.

Problems such as these which frequently arise in American cities during the process of growth and change, should not be settled by arbitrary theoretical considerations alone, but from the practical viewpoint of how to render the best and most efficient service to the community as a whole, rather than to look at the problem with the coldly calculating eye of the man who trades only in dollars and cents. For such a service is essentially a government service, whether paid for by the city government or by a private utility. The money comes from the same people, citizens, voters. It is essentially a government service because it is a service which must be rendered to all the people of the community at rates not based wholly on delivery costs. Indeed, the government responsibility is greater when the transit service is privately rendered, for then the service is to a considerable degree at the mercy of government, whose obligation is to prevent oppression, not to indulge in it, to encourage life, liberty, and the pursuit of happiness, not to dry up those qualities in any element of the community. As this magazine has so often asserted, *genuine* cooperation is the road to modern city transportation.

Land-Value Increment Taxation for Regulation and Revenue

EVILS associated with land speculation have, from time to time, led to various proposals for some stricter regulation of the transfer of land titles. The majority of such plans are of a fiscal character and call for special types of taxation. A stamp tax, for example, which imposes graduated rates upon deeds of conveyance is a measure, recently suggested,[1] that is calculated to exert a powerful regulatory effect upon speculative trading. A rising scale of rates, varying directly with the percentage increases in sales price and inversely with the length of time the property has been held, would tend to discourage rapid turnover of titles for quick, speculative profits. A similar effect could be produced through the use of a capital gains tax which would allow cumulative deductions for past property taxes paid by the seller during the period of ownership. Like the first plan, this would penalize high profits realized over a comparatively shore period of time.

In analyzing the effects of fiscal devices of this sort, especially with respect to urban areas, an important consideration is the matter of the stability of local revenues. It is a well-known principle that as taxes become more successful in their intended regulatory influence, they are less and less productive of revenue. Local governments of already matured cities, depending primarily upon real estate tax revenues, can ill afford to permit the imposition of confiscatory tax burdens of a character that might produce a general deflationary effect upon the land-value tax base. Moreover, in spite of the fact that there is an element of "unearned increment" in rising urban land values, a considerable proportion of such increases may be the result of private initiative, involving rather heavy costs for improvement and development.

A practical proposal which seeks to compromise the regulatory goal with that of stable, or even increased, revenues, is that of the increment tax. This measure is suggested in full recognition of the fact that the burden of the tax must be sufficiently great so that it acts as an effective check upon speculative activity; yet not so high as altogether to discourage further private real estate operations which involve the development or conversion of use of urban land. Increment taxation involves the imposition of a moderate percentage levy upon future increases in land value. In other words, with every increase in the value of land over a previously established high level, a tax would be imposed upon such increase. The rate of the tax may be either proportionate or progressive; the frequency of collection might be determined by the rate of turnover of title, or on a periodic basis of assessment irrespective of sale or transfer. While extremely sensitive to cyclical variation and therefore lacking in stability and elasticity, this tax is well suited to capital financing involving the use of a revolving fund or the temporary issue of improvement bonds. It is not proposed as a substitute for local property taxes but rather as a supplement to the local tax machinery.

Had a tax of this description been in effect in some of the leading American cities since the turn of the century, hundreds of millions of dollars in municipal revenues would have been raised in this way. As a result, the much more arbitrary, and somewhat inequitable special assessments for public improvements might have been unnecessary. At the same time, the regulatory effects of this tax would probably have operated to curb at least some of the premature developments and unhealthy expansions of values.

EDWIN H. SPENGLER.

[1] J. A. Baker, "The Graduated Farm Land Transfer Stamp Tax," *Jour. of Land and Pub. Util. Econ.*, Feb., 1940, pp. 21-29.

[2] Based upon "The Taxation of Urban Land-Value Increments," *Jour. of Land and Pub. Util. Econ.*, Feb., 1941, pp. 54-58.

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During April we hope you will remember to mention THE AMERICAN CITY.

In Oshkosh, Wis.

Business Methods Reduce Insurance Cost 28%

By Rud F. Kriz
Comptroller, Oshkosh, Wis.

AT THE time the city of Oshkosh changed the form of government from a three-man commission to the aldermanic form, in 1933, the matter of all kinds of insurance received thorough consideration. Mayor George F. Oaks turned the job of investigating the city's insurance policies over to the writer, who had been an experienced insurance man before entering politics.

It was discovered that all insurance was bought on a patronage basis. We were confronted with two claims for workmen's compensation aggregating over $24,000, which were not insured, and it was very questionable whether or not they were compensation cases. When we took office, an order existed to pay, and we are still paying. We immediately proceeded to buy workmen's compensation insurance, which cost us $12,000 to $14,000 per year in premiums. We carried this coverage for five years, and during that time we discovered that it was a very profitable business for the insurance companies, because their losses averaged approximately 15 per cent of the premiums paid. Therefore, in the latter part of 1938, we decided to carry our own workmen's compensation. We arranged to put $10,000 in the budget for an insurance trust fund, which now amounts to approximately $20,000, and when this amount reaches $25,000 according to the set-up, we will discontinue the annual payments until the fund gets low again and will have to be replenished.

We found that the city's motor vehicles carried individual policies, and the 43 cars covered carried 5 and 10 limits. There were three trucks insured that had been junked three years before, and the total cost for insurance premiums on the 43 city-owned cars was $3,750. In 1934, we listed all city-owned motor vehicles, including tractors and trailers on a fleet, and had bids taken. The coverage was boosted to 10 and 20 on all cars, and the school bus 50 to 100 thousand. We placed the business for $1,800, and at present we have 57 cars insured in addition to tractors and trailers, at a cost of $2,006.60.

In 1933, the city carried fire insurance on all public buildings, amounting to $900,000 and costing about $18,000 every three years. This situation created an awful political issue, because the public would say the buildings are over-insured, and the insurance people would argue that they were under-insured, and it was not possible to prove the contention wrong, because the policies were full-rate policies. No appraisal was ever made, and your valuation was as good as mine, so you can draw your own conclusion. At that time, the city of Oshkosh had a 5th class rating.

Our Fire Department was always efficient, as proved by the fact that we have received National Safety Council Contest awards first and second, in the last few years. It has always been the policy of the city of Oshkosh to keep this department well equipped and well trained.

With the cooperation of our local Underwriters, and the city Water Department, we had an appraisal made of all the city's buildings, and then we decided on an 80 per cent co-insurance clause in 1934. We also arranged our insurance policies so that one-third of them came due each year, in order not to create an undue tax burden every three years. From time to time, our Water Department made the improvements requested by the Underwriters. In close cooperation with the Rating Bureau, all hazards brought to our attention were eliminated as quickly as possible. It is necessary to con-

Fire Department Efficient

The Fire Department consists of 60 men, including officers. They operate on the so-called double-platoon system, 24 hours on, then 24 hours off. The equipment consists of 114 alarm boxes fully equipped, and a private telephone system, over which most alarms are received. There are four 1,000-gallon American-LaFrance pumping engines, two 500-gallon Pirsch pumpers; one 75-foot American-LaFrance aerial ladder truck, and one 60-foot Pirsch aerial ladder truck; one combination chemical hose truck, one car for the Chief, and one car for the mechanic.

We carry 19,000 feet of 2½-inch hose with lugs and couplings, 1,300 feet of 1½-inch hose, and 2,600 feet of ¾-inch booster line hose. There are six fire stations and seven companies, two in the central station.

It is our contention that a fire department is less valuable for the fires it extinguishes than for the fires it prevents. Therefore, we have a thorough system of inspection through the entire year, and not only during Fire Prevention Week, as follows:

Special inspection of all manufacturing places once every week.

Regular inspection of all business and manufacturing places once every three months.

Fire drills at the schools every month.

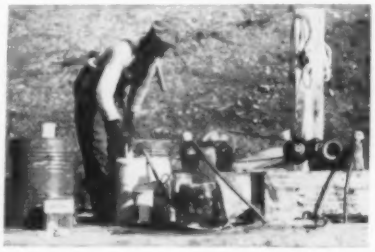
Dwelling inspection every fall of the year.

During Fire Prevention Week in October, a check-up of all this work is made, and the general public is made fire-conscious by the press, talks, and radio. During the last five years, our fire losses amounted to less than $33,000 per annum (62 cents per capita), rather remarkable, inasmuch as a large number of our industrial buildings and nearly all dwellings are of wood construction.

"Hurry-Up" Sterilization of New Laid Mains at U. S. Army Bases

31.8 miles of pipe made safe at new Army Training Camp, Joseph T. Robinson, Ark.

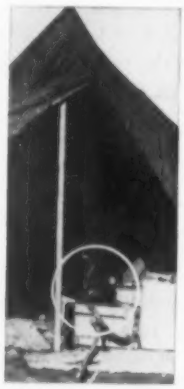
Tackling the job of sterilizing 31.8 miles of main ranging in size from 6" to 16" and doing it in a hurry is no small undertaking. Yet, it was completed in 56½ days—working under difficulty of an inadequate, partly finished water supply part of the time—using Midget Chlor-O-Feeders pumping strong hypo solution into the new main—to produce a chlorine residual of approximately 50 ppm.



"Dis is de best job I'se had yet. I just mixes up that white powder and them little red pumps (Midget Chlor-O-Feeders) does all the work."

This job was performed by Lund Engineering Co., Little Rock, Ark., under the direction of the Engineers on the camp project, Black & Veatch of Kansas City, Mo., and supervised by A. V. Perry, their Chief Resident Engineer, and Charles F. Samuel, Water Supply Engineer, of Little Rock Water Department.

Mr. Alfred Lund specifically thanks us for our help and advice on this problem—he is certainly welcome and so are you for any "hurry-up" chemical feeding service we can render.



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Fort Wetherall, R. I.
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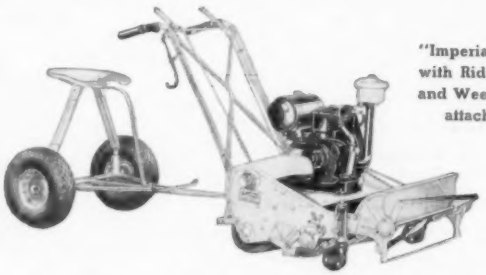

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tinue this work where low-cost insurance is desired.

At this writing, the city of Oshkosh carries $1,629,850 insurance on fire and tornado, costing annually approximately $5,000, as compared to $6,000 previously. Add $1,000 saved on this insurance to the saving of about $1,700 for the insurance on city-owned cars, and we have a reduction of 28 per cent from the cost of the insurance before the revisions were made. All arguments have been eliminated, because we have the appraisal and we insure 80 per cent of the building and equipment. We are now one of three cities in Class 3, the lowest insurance classification possible for our city, saving our business men thousands of dollars in insurance premiums annually.

To arrange insurance efficiently for any municipality requires considerable attention. You have to keep records of your policies and go after all hazards as soon as attention is called to them. Sometimes it is advisable to have a special rating made on older buildings, particularly if they are being remodeled or renovated, because, in public buildings, repairs are made or someone will decide on a change, and create a hazard. Sometimes this is done by tearing down a "No Smoking" sign, or some other little thing that increases the rate, though the person that does it is never aware of the consequences.

Oshkosh has always carried stock company insurance as represented by the local Underwriters board. The Council has always turned thumbs down on mutual insurance on account of the liability involved, although there is a slight saving in premiums.

National Committee Organized for Study and Action on the Housing Emergency

TO FUNCTION during the present crisis, there has been formed, with headquarters at 6 East 45th Street, New York, a National Committee on the Housing Emergency. This temporary organization, of which Mrs. Samuel I. Rosenman is Chairman and Albert B. Ashforth, Jr., is Treasurer, will aim to strengthen the cooperation of private and public activity in meeting the housing needs of workers in defense industries and of families of low income; to coordinate the efforts of existing housing organizations and of persons not heretofore active in the housing field; and to preserve for the future, values created by current expenditures for defense housing.

In a statement just issued, seven elements in the housing emergency and three major objectives of the Committee's work are listed:

Elements in the Housing Emergency

1. The serious housing shortage in communities where defense industries or military or naval establishments require rapid expansion of private and public facilities and services.

2. The danger that this shortage will seriously impair the efficiency of defense operations.

3. The danger that the urgency of the present crisis will deflect, to an unnecessary degree, consideration of the long-standing housing problem, especially of those families whose needs private industry is unable to meet.

4. The danger that, under the acute pressure of haste in meeting emergency needs, many communities will fail to provide housing so designed and located as also to serve, wherever feasible, permanent housing needs.

5. The danger that unplanned and uncontrolled housing expansion may, after the emergency, glut the real estate market, dissipate otherwise sound equities, and add to the blight and decay.

6. The danger that the shortage of dwellings, particularly for families of low and moderate incomes, will lead to unconscionable rent increases, intensify overcrowding, and undermine the health of workers and their children.

7. The danger that the temporary increase in incomes of many workers in defense industries, coupled with a shortage of homes for rent, will result in their being persuaded to make extravagant or unwise commitments for home ownership which may lead to future foreclosures and distress.

Objectives

To help in solving these urgent problems, the National Committee on the Housing Emergency has been organized to:

1. Consider and analyze housing and neighborhood improvement needs throughout the United States as related both to the immediate demands of the national defense emergency and to long-term advancement of the public health, safety, and welfare.

2. Formulate or evaluate proposals for Federal and state legislation to meet such needs.

3. Support such legislation in the public interest, and stimulate prompt action and efficient administration in the field of housing.

A Study of 144 Planned Communities

A 160-PAGE study of planned communities, profusely illustrated with maps, charts and photographs, is an important feature of the National Resources Planning Board's report on "Urban Planning and Land Policies," released last month.* In this study, Arthur C. Comey and Max S. Wehrly appraise 144 of those comparatively few communities which, unlike the ordinary city, have actually been constructed from the start according to a more or less comprehensive physical plan.

Here is the authors' summary of their conclusions and recommendations:

Planning new communities in America has succeeded in preventing or at least in postponing many of the difficulties and problems so familiar in the ordinary unplanned city. These planned communities, largely as a result of forethought expressed through their planning, are comparatively free from overcrowding of buildings and population. Their inhabitants enjoy greater efficiency, greater safety, and a more healthful and, in a very great measure, a more attractive environment. Many of these communities exhibit an unusually high degree of social cohesion and community spirit. Where adequate safeguards were incorporated in the plan, these communities retain their identity for a long period or indefinitely. Deterioration through obsolescence is greatly reduced.

Under conditions of long-time unified control, intelligent planning may confidently be expected to be effective as a tool in the hands of those working for community welfare in preventing the ills and conflicts of purposes and interests otherwise likely to occur in the development and continued existence of future new and enlarged communities.

1. Planning for achieving such results should be applied wherever a new community is to arise or an old one is to be extended. This may be done by a variety of agencies—private, such as industry, real estate enterprise or philanthropy, or by government, the important factor being continuity of the agency in control, or at least continuity of its purpose.

2. The success of planned communities has been so pronounced as to justify fully the recommendation that the several agencies, official and unofficial, in a position to do so should bend every effort to promote community planning. It appears fully warranted to urge further, in the light of the success of planning for new communities, that similar planning methods may likewise be applied generally in established urban areas with a promise of success towards the remedying of the ills and problems of our urban environment and existence."

* See also pages 91 and 113 of this issue.

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Cement-Lining of Pipe

(Continued from page 62)

place by a 2-inch telescoping pipe as a back stay. The vertical leg of this spiral welded pipe of 1/8-inch plate was used to furnish a head to force the lining mixture into the main. The loading pipe has the pulling cable which carries a loading plunger consisting of a rubber disc and steel backing plate threaded through it. After the slump of the batch was tested and found to be satisfactory, pipe horses were put across the trench carrying planks, and the riser of the loading pipe was filled with the mixture of cement and sand. In this particular instance the slump was sufficient to permit the material to flow without using the plunger until the very end of the loading. At times, however, when the mixture is slightly drier, for small pipes particularly, it is necessary to push the material ahead by running the plunger down the pipe and pulling it back again and loading more of the lining material.

After all but one bucketful of the lining mixture had been poured into the pipe, the plunger was pulled down through the vertical leg of the loading pipe and right up to the 8-inch pipe. Then the loading pipe was removed and the plunger taken off, and the Tate lining machine attached to the cable, lined up carefully at the start and pulled through the pipe at a rate of 6 feet per minute. This speed is varied from 5 to 10 feet per minute, depending on the ease with which the lining machine moves within the pipe while it is pressing the cement and sand mixture as a uniform lining around the inside of the pipe.

At the exit end of the pipe a laborer held a sack close up around the pipe to create a back pressure against the machine so that it would spread the lining uniformly to the very end of the pipe. There is no cable attached to the back of the machine, so there is nothing to damage the lining, which on examination at the entrance end of the pipe after the machine had advanced some 15 or 20 feet, showed a tough consistency before it took up its initial set. In 24 hours the main was placed back in commission by replacing the cut-out segments by using Dresser couplings.

The Lining Machine

The Tate lining machine is an assembly of two sets of guides, a conical brass section with another set of guides and a carefully machined and perforated skirt at the end, all held rigidly by a bolt passing entirely through the machine, and with lock nuts at the head end and inside the conical section. The two sets of heavy spring guides are set at 90 degrees to each other so as to center the machine in its passage through the pipe. They are slightly larger in diameter than the inside of the pipe being lined, and consequently are slightly compressed and accurately center the machine. The skirt is carefully machined to be 1/4-inch larger in diameter at the tail end than at the beginning, so as to give final compression to the lining. It is perforated in a band about 5 inches wide with small openings larger on the inside than on the outside, through which the excess water in the lining flows down to the bottom of the pipe, leaving a small flat deposit in the bottom of the pipe on the lining.

The squeezing given to the lining material as this machine passes through forces it into any joints in the pipe, making the lining a continuous tube and covering any jute which might be reached by the water in its passage through the pipe; thus, in addition to coating the pipeto prevent further tuberculation, it also covers the jute, which is now under suspicion in so many places as a cause of increased bacterial growth in supply lines.

Results Secured

On October 30, 1940, the Danvers Water Board received a report from the Massachusetts State Department of Health giving the final analyses after the line had been in service for about four months. The following is an extract:

"The recent examination indicates that there are now no complaints as to taste, odor or color of the water supplied on Clinton Avenue and Endicott Street, but that there has been some complaint as to an increase in hardness of the water.

"The results of the recent analyses (dated 10/40 in the table) show that the water contained somewhat less iron than at the time of the examination in December, 1939, and the color of the water supplied in the vicinity of Endicott Street and Clinton Avenue was not appreciably different from that at the pumping station. The hardness of the water had increased considerably in the vicinity where the mains had been lined with cement. This condition was to have been expected, but it has been the experience of this Department that the effects of the cement lining upon the water will disappear within a short time. So far as is known to this Department, hardness of water such as experienced in this vicinity is not detrimental to health."

We feel that the trouble has been corrected and the solution of iron by the water has been eliminated. The increase in hardness, mentioned in the report, is fast disappearing. In addition, we have increased the carrying capacity of the main and, based on the experience of others, we feel that it has been at least doubled.

The estimated cost of laying a new line was about $2.50 per foot, while the 8-inch main was cleaned and relined for 69 cents per foot and the 6-inch line for 63 cents per foot. The results have been so satisfactory that a larger amount of this work is planned during 1941.

The work of lining the 8-inch and other mains in Danvers by the Tate method was done by E. H. Lewis, Pres., Tate Pipe Lining, Inc., Andover, Mass., under direction of J. Hindle, of Melbourne, Australia, who represents the parent company in training crews for this work in the United States and elsewhere.

Water District Power

(Continued from page 45)

services can best be met by increasing efficiency both in men and in machines.

The Manhasset-Lakeville Water District Water Commissioners include Kenelmn Eden, Chairman; George L. Gehrig, and Clarence G. Hamel. J. B. Reeves is Superintendent of Water for the District, and Sidney B. Bowne was retained as consulting engineer for the expansion program. The Turbine Equipment Co., New York City, was general contractor for the work and furnished and installed the new diesel engine, pumps, gears and auxiliary units.

April showers bring . . .

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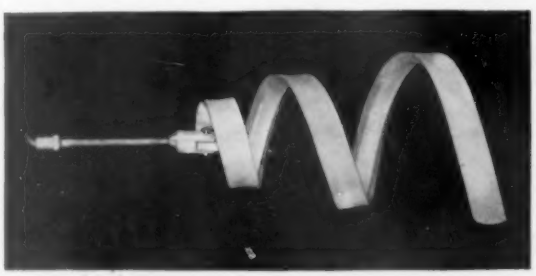

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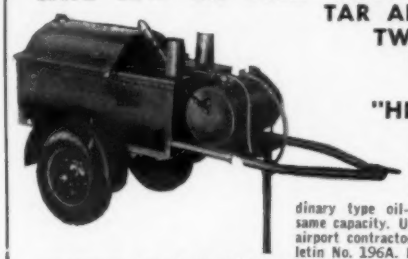

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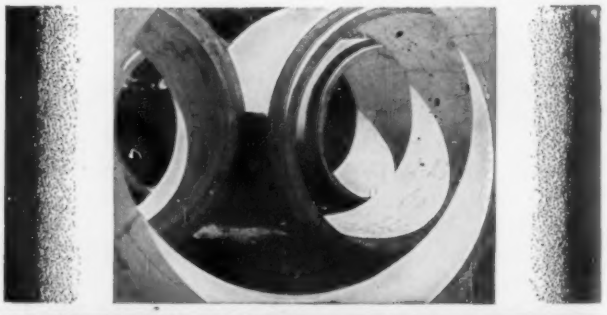

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Forward Steps

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The City-County Administration Building of the Civic Center at San Diego, with San Diego Bay in the Background, and Pacific Boulevard in the Foreground

First Unit of Civic Center Completed

SAN DIEGO, CALIF.—The first unit of San Diego's projected harbor-front Civic Center, the City-County Administration Building shown in the accompanying illustration, has been completed. Its construction was a splendid example of cooperative effort.

When the enterprise was first discussed some years ago, the San Diego Chapter of the American Institute of Architects volunteered to prepare preliminary sketches of the building. A State Emergency Relief Administration project was therefore instituted to do the work under the direction of a committee of three architects chosen to represent the chapter—Louis J. Gill, Richard S. Requa, and the author. The preliminary sketches were completed, but for some time the promotion of actual working drawings languished because of lack of money.

Finally, in the fall of 1935, the project was revived when a WPA grant of about $986,000, and city and county grants of $53,000 each, were made. A contract for the design of the building was awarded to the above-mentioned architects, who added Sam W. Hamill to their number. A WPA project drove the piling, put in the concrete substructure, and brought the building up to the level of the main floor. A contract was let for the remainder of the shell of the building, and the roughing-in for plumbing, heating and wiring. To finally complete the structure, two additional appropriations were made in equal amounts by the city and county, making the total cost for the building approximately $1,500,000.

Constructed of reinforced concrete with tile and composition roofs, the building has two principal façades—one fronting on Pacific Boulevard, the main thoroughfare from Los Angeles, the other on the Harbor Drive at the very edge of San Diego Bay.

City and county officials worked harmoniously with the architects toward a common end. The resulting dignified building houses practically all the city and county offices except those of the county clerk, and the courts.

The site of the projected Civic Center consists of 18 acres of reclaimed tide-lands acquired by the city. Other buildings contemplated are the law courts, a civic auditorium, a welfare building, an armory, and possibly a state administration building. They will be located north and south of the Administration Building, on the Harbor Drive.

WM. TEMPLETON JOHNSON, F.A.I.A.
Architect.

Township Manager Plan Of Government

NATRONA, PA.—The township of Harrison has just completed its first year, 1940, of operation under the township manager plan of government. This method has proved very successful, as the following high lights in the success of the plan will verify.

T. B. Young, the Township Manager, is a registered engineer. He does all engineering work required by the township, such as surveying, planning improvements, and drawing plans, in addition to his other duties of management, at less cost to the township than former engineering costs alone. All departments are under the direct supervision of the Manager and are coordinated to give maximum service to the taxpayer.

The Manager serves as contact man for the township Commissioners in township dealings with the WPA, the County, the State, the Department of Health, etc. This saves time and money by eliminating the usual preliminary detail work in making arrangements for various civic projects. All purchasing of equipment, materials and supplies is supervised by the Manager subject to approval by the Commissioners, and has proved very satisfactory.

Much progress in civic improvements was made in 1940. A $100,000 storm-sewer project, jointly sponsored by the township, Allegheny County and the Pennsylvania Railroad, was started and is now well on the way to completion. This is a long-needed improvement and will save thousands of dollars yearly in sewer and street maintenance costs. Under Mr. Young's direction a township-wide WPA project covering all township improvements for the next five years, has been worked out and is now in operation. Also, an engineering project by the WPA has been worked out and approved, providing a complete survey of the township with detailed maps and information, which will prove invaluable in the future.

The year 1940 marked a new era in township government. Despite numerous civic improvements and additional services provided the public, upwards of $10,000 was saved over the previous year's expense of operating the township. The bonded indebtedness of the township was reduced by $10,000 in 1940, and, owing to econo-

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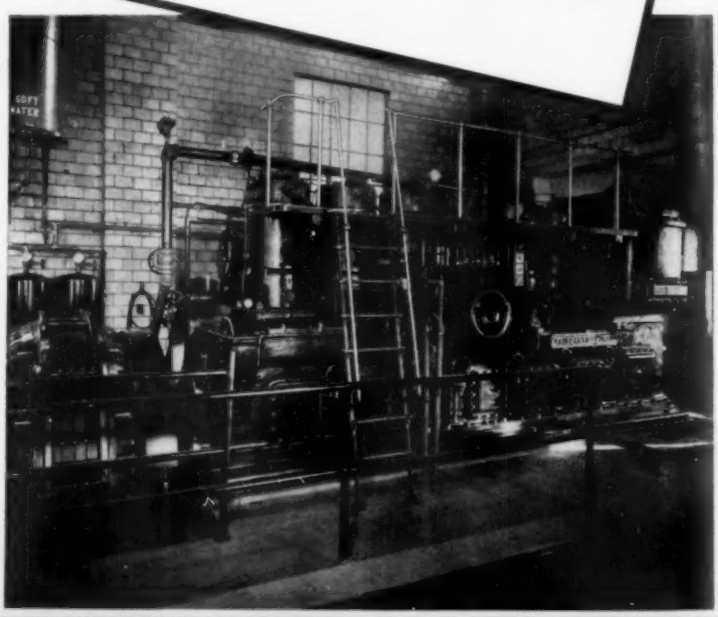
. . . when expansion was required this new, larger, heavy-duty F-M Diesel was the obvious choice.



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mies in operation, $21,000 of bonds will be retired in 1941, and an increased number in 1942, according to present plans. The taxpayers of the township heartily endorse the manager plan of government after having seen it in operation for one year, and after having compared the statements of financial status with those of other years.

The township manager plan of government is herewith strongly recommended to any township desiring an efficient, economical and progressive plan of operation.

C. A. GROVE,
Secretary of Harrison Township.

The Queen's Float and Her Court of Honor in the Indiana Tomato Festival Parade, at Elwood

This Library Began in a Filling Station

BUHLER, KANS.—Seeing the need of a town public library, during the fall of 1936 the women of Buhler decided that if the men were too busy to meet such a need, they would do so. With the aid of the community YMCA, the Chamber of Commerce, the Parent-Teachers Association, and numerous church and community entertainments, they gathered the necessary starting funds. But where to house their venture was the burning question. There was only one vacant building in town—an old gas station, its loud outside yellow and red color combination in striking contrast to the quiet interior of a library.

However, the women were undaunted and, through the kindness of the former gas-station owner, Samuel Schneider, who donated the use of his building rent free, and by the hard-work of cleaning up, the Buhler Public Library soon became a reality. From this meager beginning, under the able guidance of the library committee composed of Mrs. N. J. Thiessen, Mrs. I. C. Hamm and Mrs. Harold M. Regier, the library grew until, at the end of the first year, there were some 800 volumes already on its shelves, catalogued by Miss Horore Becker and J. E. Schmidt, the town High-School librarian.

Last year, when the old filling station was torn down, the library was temporarily housed in the rest rooms of the new oil station. With the completion of the new business block on the site of the old filling station, space was allotted in the building's plans for the town library, a large, comfortable, well-lighted room. The rent and the lighting are the financial responsibility of the City Council, leaving only the expenses of a librarian to be met by the library board. Upon moving to the new library home, open house was held by all the town merchants, while the Boy Scouts made collections of any donated books which could be added to the library. During this second year in its new home, the library has so far bought around $150 worth of new books.

Thus, from the humble beginning in a filling station less than five years ago, the Buhler Public Library has about 2,000 volumes and a steady reader demand of over 220 members.

The Library Committee gave a program and sponsored a few food sales to raise funds to purchase new books. This town is becoming more library-conscious each year.

MRS. H. T. ESAU,
Librarian.

The Filling Station Where the Public Library of Buhler, Kans., Began.

City of 11,000 Attracts 60,000 People to Tomato Festival

ELWOOD, IND.—The annual Indiana Tomato Festival every year attracts 60,000 people to this city of 11,000.

The three-day celebration is opened with the coronation of the Festival queen, followed by a spectacular street parade of the queen, her court, and a procession of gay floats and bands. A bathing-beauty contest, a water carnival, a 15-piece all-girl band, a big-time stage revue, a tomato-picking school, a queen's ball, and the appearance of national celebrities, are many other features of the gala entertainment. The Festival queen, selected from among three Indiana districts, and the princesses of her court, are given a three-day trip to Chicago.

Elwood is in the center of the area of tomato growing and canning—an industry which provides work and capital for thousands of Indiana families during the summer and fall. Conceived and inaugurated in 1937 by a group of Elwood merchants and business men, who created a permanent organization for its perpetuation, the Indiana Tomato Festival aims to make "Indiana tomatoes" a by-word in the homes of the nation.

The success of the affair is attributed to the cooperation of Elwood citizens, Purdue University, and The Indiana Canners Association.

PAUL J. FETTIG,
President, Indiana Tomato Festival, Inc.

For suggestions on departmental reporting, see the fourth article in our series, "Local Government is News," on p. 73 of this issue.

In SEWAGE Disposal Plants the emphasis should be on the word SEWAGE— BUT,— in cities not using the O.K. CHAMPION SEWER CLEANERS

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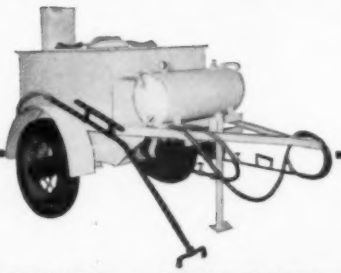

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Pamphlets on Water Rates and Service Charges

The detailed water rates and service charges for 145 cities in the United States have been reprinted in pamphlet form, issued January, 1941. Price $1.

Similar pamphlets were issued in 1940, 1936 and 1935—no duplications. Price 50c each.

THE AMERICAN CITY, 470 Fourth Avenue, New York.

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How a Graded Tax Would Affect Certain Cities

"TAXATION as an aid or Handicap to Rational Urban Land Policies" is the subject of a 30-page section of the National Resources Planning Board's report on "Urban Planning and Land Policies," released last month and reviewed briefly on page 113 of this issue of THE AMERICAN CITY. In an appendix to the report, George A. Blair analyzes the effect of a graded real estate tax if adopted in certain American cities. Excerpts from this study follow:

There has been much theoretical discussion of late as to the advisability of so modifying the customary method of real-estate taxation in American cities as to derive a larger proportion of tax revenues from land values and a smaller proportion from levies on buildings and other improvements. No comprehensive studies have ever been made, however, as to how the various groups of property owners in a given city would be affected financially by a shift to a graded tax of this kind. The object of the investigation described below was to make a start toward supplying such data for several typical municipalities.

Through the cooperation of local officials, aided in several cases by WPA workers, data concerning the assessed value of taxable improvements and their sites were obtained for 16 cities.* The total assessed value of the improvements in a given municipality was compared with the total assessed value of taxable land (other than vacant lots). The resulting ratio of building value to land value was considered "par" for that city. For example, in a city where taxable non-vacant land was assessed at $80,000,000 and improvements at $120,000,000, the ratio of building value to land value would be 1½ to 1. In that city, an improvement would thus be "under par" if valued at less than 150 per cent of its site value, and "over par" if at more than 150 per cent.

Separate data were obtained for the following classes of property:

1. Single-family or two-family homes assessed at less than $10,000 for land and buildings combined
2. All other property wholly residential
3. All property having business and residential uses in the same building
4. All property used wholly for business purposes
5. All property used for industrial purposes
6. All taxable property of public utilities
7. All taxable property used for any other purposes
8. Vacant land

Calculations were made as to the effect on each class of property of a shift from the present tax system to one whereby the same amount of revenue would be raised on the same assessed valuations but at a tax rate which would be one-half as high on improvements as on land.

After applying the graded tax—that is, adjusting the rates without changing the total budget, so that the tax rate on improvements equals one-half that on land—it is found, as might be expected, that in almost all cases "over-par" developed properties would pay less, and "under-par" developed properties would pay more, than under the ordinary straight tax. The graded tax would appear to be especially beneficial to the small home owner and also to serve as an incentive to the development of vacant land. These tabulations also reveal that industrial property is, in general, highly developed in proportion to its land value, and this would pay less under the graded tax plan. This is true in all but one of our fifteen cities.

On the average, under the graded tax plan, vacant land would absorb 63 per cent of all the decreases by which other property classifications would benefit. When the 15 cities are arranged according to population, five of the seven with above 20,000 people fall below this 63 per cent average. On the other hand, six of the eight other cities are above the average.

Conclusions from the Study as a Whole

1. Over 50 per cent of the tax shift would fall upon vacant land, thus forcing a reduction in speculative prices and stimulating improvement or public acquisition.

2. Business properties would feel much of the rest of the weight of the tax shift, which would:

(a) Induce physical improvement to squalid office buildings

(b) Tend toward vertical development of cities to the extent permitted by zoning ordinances

(c) Force some properties into public ownership, making available sun, light, and air to adjoining office buildings through abolishment of the unfit

3. In the larger cities, many low-class and tenement houses were found. Through a materially higher tax on their unusually valuable land, they would be induced to make improvements, which would be lightly taxed.

4. The graded tax plan would promote more home ownership by lowering the taxes on the high-grade property, and would aid in the development of new large-scale, low-rent housing projects.

* These were the 15 municipalities listed in the accompanying table, and Boston, for which the study was on a basis not strictly comparable with the others.

SUMMARY OF RESULTS OF GRADED TAX PLAN STUDY FOR 15 MUNICIPALITIES

Detailed analyses of the application of the plan to each community are given in separate tables in the report

City	Population	"Par" [1]	Assessed value		Total taxes on real estate	Tax rate per $100 1936 [2]	Tax rate under graded plan [3]		Percent of total tax decrease for other groups absorbed by vacant land	Typical taxes under present and graded plans			
			Land	Buildings			Land	Buildings		Home owner [4]		Slum tenement [5]	
										Present	Graded	Present	Graded
Milwaukee, Wis.	578,249	178	$306,092,180	$479,713,940	$24,635,021	$3.135	$4.51	$2.25	46	$250	$216	$877	$1,093
Indianapolis, Ind.	364,161	81	31,927,522	25,179,998	1,473,374	2.58	3.30	1.65	12	206	159	722	794
Louisville, Ky. (6 census tracts)	307,745	278	6,491,305	16,534,194	524,981	2.28	3.55	1.77	75	182	170	638	854
Yonkers, N. Y.	134,646	211	125,955,576	195,399,060	10,787,650	3.36	4.82	2.41	67	268	221	940	1,157
Trenton, N. J.	123,356	217	49,742,275	100,356,950	5,538,698	3.69	5.54	2.77	27	295	266	1,033	1,330
Little Rock, Ark.	81,679	151	14,565,650	17,839,387	1,377,214	4.25	5.86	2.93	62	340	281	1,190	1,407
Hoboken, N. J.	56,261	130	33,143,800	37,807,300	3,611,411	5.09	6.94	2.47	57	407	333	1,425	1,666
North Little Rock, Ark.	19,418	252	1,367,266	2,428,895	144,258	3.80	5.58	2.79	94	304	268	1,064	1,341
Winthrop, Mass.	16,852	350	3,158,275	8,376,930	199,915	2.60	4.08	2.04	99	208	186	728	980
Winchester, Mass.	12,719	366	7,257,650	22,539,175	822,393	2.76	4.43	2.21	65	220	213	773	1,065
Manhattan, Kans.	10,136	216	2,857,510	5,665,985	339,576	3.98	5.96	2.98	36	318	286	1,114	1,430
Two Rivers, Wis.	10,082	365	2,140,600	10,487,700	334,650	2.65	4.53	2.27	47	212	218	742	1,087
Madison, N. J.	7,481	162	3,155,600	5,734,000	360,917	4.06	5.99	2.99	76	325	288	1,137	1,440
North Tarrytown, N. Y.	7,417	195	7,080,460	10,934,410	774,639	4.30	6.17	3.09	80	344	296	1,204	1,481
Haworth, N. J.	1,042	350	1,039,435	957,170	79,465	3.98	5.23	2.62	99	318	251	1,110	1,256

[1] "Par" is the percentage secured by dividing the total assessed value of taxable improvements in the city by the total assessed value of their sites. The value of vacant land is not included in determining "par."

[2] The tax rate given is for 1936, with the exception of Milwaukee (1935), Indianapolis (1934), and Little Rock and North Little Rock (1935).

[3] Assuming the same total revenues from real estate and no change in assessed values, but a tax rate on buildings one-half that on land values.

[4] Assuming a dwelling assessed at $6,400 on a lot assessed at $1,600.

[5] Assuming an obsolete building assessed at $8,000 on land assessed at $20,000.

VALUE

Plan to attend the 61st Annual Meeting of the American Water Works Association at Toronto, Ontario, Canada, the week of June 22nd to 26th, 1941.

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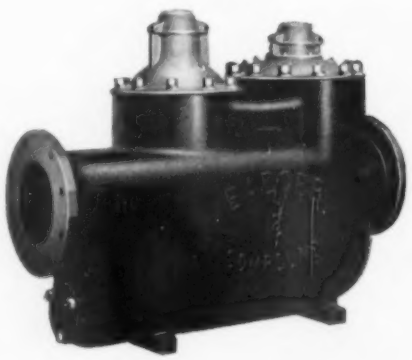

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Current Items from the Public Administration Clearing House

Motion Pictures to Publicize Local Affairs

MOTION PICTURES produced by American cities to inform citizens of municipal services and activities "have been instrumental in stimulating thinking on local affairs," the International City Managers' Association reports in a study on production and use of movie films by cities of more than 50,000 population.

Thirty-five of the cities—about one out of six—have made one or more motion pictures for use in reporting to citizens. Movies showing general activities have been made by 10 of the 35 cities—Atlanta, Berkeley, Dallas, Detroit, Evansville, Ind., Fort Worth, Lowell, Mass., Milwaukee, Portland, Ore., and Topeka. The other 25 cities filmed activities of specific departments, such as recreation in Dayton, health and fire fighting in East Orange, N. J., and parks and water works in Chicago.

Amateur photographers were used in 17 cities in producing their films, professionals in 10 cities, and both amateurs and professionals in the other 8. Sound films have been made by six cities—Atlanta, Berkeley, Boston, Chicago, Schenectady and Tacoma; colored movies by a few. Specially prepared scenarios were followed in Austin, Texas, Boston, Denver, Pasadena and Cleveland.

Production costs varied widely, according to the study. Detroit's general movie cost $25,000, while Atlanta's sound film cost $2,500. Pasadena, Cleveland, Louisville and New York spent from $500 to $1,000; Denver, East Orange, Lansing, Mich., and Springfield, Mass., spent from $250 to $500.

Although the average time spent in making municipal movies in 21 cities was 16 weeks, some were made in a few hours or days, while others required six months or more to complete. A Schenectady film describing the evolution of the fire drill tower was completed by a professional photographer in three hours, and a film "shot" by amateurs showing treatment of sewage was made in three days. In some cities, however, outstanding developments of public interest were filmed as they occurred during the year, then edited and entitled so that a coherent sequence would result.

Most of the films run from 25 to 45 minutes in length. Several films take 10 or 15 minutes, while movies of two cities, Detroit and Portland, run 75 minutes. Twenty-four of the 34 cities own their own projectors; 18 have the 16-mm size, two the 35-mm size, and four both sizes.

Attendance figures show that an average of 83,000 persons viewed municipal movies of 26 cities; this does not include Detroit, where, city officials estimate, 7,000,000 persons have seen city movies to date. Most of the films are shown before such widely diversified groups as educational organizations, service clubs, churches and movie theater audiences. The film "The City of Atlanta at Work," 20 minutes in length, is substituted for shorts in local theaters; so are Chicago's "Fun on the Lake Front" and "Baseball."

"Municipal Service," a colored movie made by Portland, is one of the newest. The script was written, directed and edited by a city employee, and the scenes were shot by the city photographer. The film features activities of the harbor patrol, training of police and firemen, and the removal of unsound and overhanging trees—services not so well known by the general public but important safety, health and protection factors.

Court Upholds Tax on Non-Residents for Use of City Streets

A PADUCAH, KY., ORDINANCE imposing an annual license tax of $5 on non-residents who operate motor vehicles on the city's streets has been held valid by the State Court of Appeals, according to the American Public Works Association. The Court said the tax is imposed under the city's police power for the privilege of using the city's streets, and is not a tax on non-residents' automobiles. The ordinance covers all non-residents who use the streets in connection with a business conducted or regular profession followed within city limits, or as a means of conveyance to and from a job in the city.

Another ordinance involving the use of city streets, this one aimed at traffic safety, was upheld recently by the Tennessee State Supreme Court. The ordinance, adopted by Chattanooga, requires all motor vehicles driven on the streets of the city to be inspected by the city every six months.

The Court's decision was that the ordinance, which imposes a charge of 25 cents for each inspection, was not in conflict with state statutes but was a reasonable exercise of the police power to protect the public and make the city's streets safe.

City to Disclose Names of Gambling-House Patrons

IN AN EFFORT to discourage public patronage of gambling establishments, the Police Commissioner of New York City will furnish the names of all patrons found in raided gambling houses to all established credit rating houses which desire to have this information, the American Municipal Association reports.

Authority for the identification of such persons is found under the penal law of the state of New York which says that any person associated with, and found in, a gambling resort is a "vagrant."

Most Local Jails Found Unfit for Use

NEARLY HALF OF THE NATION'S LOCAL JAILS are reported by the Federal Bureau of Prisons as unfit for use as places of detention for Federal prisoners. The report, to which attention is called by the American Municipal Association, was based on an inspection of 3,117 local jails. Of these, only 497 were approved for general use by the Bureau of Prisons, 333 were found fit for use solely in emergencies, and 2,287 were declared unfit for use under any circumstances. Local jails often are used by Federal authorities to house persons in their custody awaiting trial or serving short sentences, thus saving the cost of transporting them to distant Federal prisons.

Ratings in the Bureau of Prisons report were made on ten factors: personnel; administration and discipline; buildings and equipment; food; cleanliness; personal hygiene practices; conditions of employment and industry; medical services ,ducation and recreation; and religious instruction. The jails received their lowest scores on the last four factors.

A rating of "fair" was given to 47.8 per cent of the jails inspected, only 2.5 per cent were rated "good," while 49.7 per cent were rated "poor."

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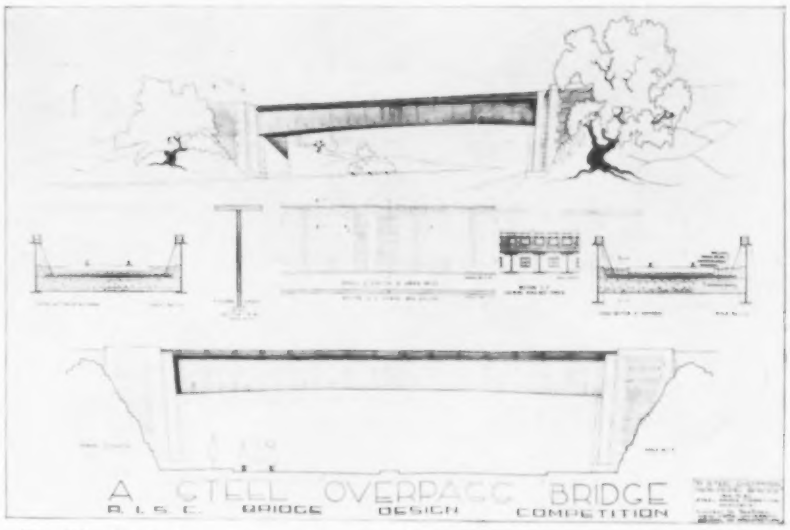
Student Bridge Design Competition of A.I.S.C.

THE 1941 ANNUAL STUDENTS' BRIDGE DESIGN COMPETITION of the American Institute of Steel Construction has been judged, and the first prize design, which won $200, is reproduced here. The winner, Vincent W. SeeBach, a student in Architecture at New York University, won second prize last year, and honorable mention the previous year. The first year he took part in the competition he won no recognition whatsoever. The second prize of $100 was awarded to R. Kenneth Kendall of Iowa State College, and the third prize of $50 to M. R. Harrison, Jr., of Iowa State College.

The problem this year was a steel overpass bridge, carrying a single-track railroad over a highway. A certificate of first honorable mention was awarded to Frank Hill, of Virginia Polytechnic Institute, and certificates of honorable mention were awarded to Carmen Vetuschi, of New York University, and to three other students of Iowa State College, namely, Eugene Groshong, Curtis C. Marston, and Carlton Mueller.

These awards were made by a jury of nationally known architects and engineers consisting of Dr. Shortridge Hardesty, Walter H. Weiskopf, consulting engineers, of New York City; John T. Briggs and M. W. Del Gaudio, architects, of New York City, and Theodore Reed Kendall, engineering editor of THE AMERICAN CITY.



The Winning Design in the 1941 Students' Bridge Design Contest of the American Institute of Steel Construction

Local Government Is News

(*Continued from page 75*)

facilities deserve highlighting—if for no other reason than to make their users more aware of their facilities.

Louisville, Ky., in spending its $1,500,000 Park Bond Fund, showed a special report with many illustrations of the new facilities—and their uses by citizens—resulting from the funds voted by these citizens.

Reports like these are sound investments of time, effort, and money. They do not need to be elaborate—indeed, they should not be. Simple statements informally presented which highlight the activities and programs of a department make for citizen-response to a department's needs and programs. The field is unlimited; initiative in developing reports and imagination in drafting them are available in every department. Basic to their success in making citizens aware of what their fellow citizens—the city's public servants—are doing and hoping is the graphic illustration of day-to-day work and accomplishment. To paraphase Burnham, "Make no stodgy annual reports." Let pictures, charts, graphs, cartoons tell the story of the text, and let the text be as interesting as the jobs which your department is doing.

City Manager Appointments

Frank T. Adams, City Manager of Ellsworth, Maine, since April, 1939, was appointed City Manager of Belfast, Maine, effective February 1.

H. E. Bailey, member of the State Highway Commission since 1939, was appointed City Manager of Oklahoma City, Okla., to succeed W. A. Quinn.

Gordon Bain, of Altadena, Calif., was appointed City Manager of Alhambra, Calif., effective March 1.

W. W. Coon, of St. Ignace, Mich., was appointed by the City Council of Harbor Springs, Mich., on February 3, to fill the vacancy created by David King's resignation.

T. J. Crooks, Resident Engineer, Virginia State Highway Department, was appointed Town Manager of Franklin, Va., effective February 15.

Carl Dennis, former City Clerk and Treasurer, was appointed City Manager of Rockford, Mich., effective March 10. He succeeds Kenneth L. Carr, who resigned to accept a position in private business.

H. P. Ford, former City Manager of DeLand and Tallahassee, Fla., was appointed City Manager of Lakeland, Fla., effective March 1, to succeed C. F. Carleton, who resigned.

Walter E. Kroening is acting City Manager of Greendale, Wis., while Sherwood L. Reeder is assistant to the Director of Management of Defense Housing Units in the Federal Works Agency.

Elgin McCleary, Supervisor of the Water Department, was selected temporary City Manager of Silverton, Ore., while the Court decides whether the popular vote on the manager plan was legal.

G. H. McCoy, General Manager of a Swift and Company plant at Agricola, was named City Manager of Bartow, Fla., at a meeting on February 3. He succeeds Charles H. Barnett, who resigned.

CLARENCE E. RIDLEY,
Executive Director, International City Managers' Association.

The Municipal Bond Market

Recent sales of new issues from March numbers of *The Bond Buyer*:

Amount	Borrower and Purpose	Rate (%)	Term (Years)	Basis (%)
$100,000	Columbus, Ohio, Motor Vehicles and Motor-Driven Equipment	1.25	3-5 Avg.	1.05
200,000	Holyoke, Mass., Gas and Electric Light	1.25	1-10 Ser.	1.06
180,000	York, Pa., Improvement	1.25	8.85 Avg.	1.66
100,000	Columbus, Ohio, Fire Department	1.25	6 Avg.	1.248
150,000	Washington, Conn., High School	1.37	9.85 Avg.	1.35
608,400	Columbus, Ohio, Deficiency	2	5.5 Avg.	1.45
275,000	St. Paul, Minn., Public Welfare	1.5	5.66 Avg.	1.43
300,000	Lincoln, Nebr., Aviation Field	1.60	10-15.5 O.-A.	1.47
120,000	Newton, Mass., Sewer	1.5	15 Avg.	1.49
119,000	Fremont, Nebr., School Dist., Refunding	1.5	3-33-3.5 O.-A.	1.5
19,600,000	New York, Housing Serial	1.75	2-50 Ser.	1.7254
121,125	Lancaster, N. Y., Municipal Building	2.25	9.16 Avg.	2.23
275,000	Brenham, Texas, Lighting and Power System Revenue	2.75	7.16-11.33 O.-A.	2.74
118,000	Dearborn Tp., Mich., Water Supply System Revenue	3	10.33-10.85 O.-A.	3.20
120,000	Somerset, Ky., Sewer System and Disposal	3.5	12.16 Avg.	3.5
104,000	Mount Dora, Fla., Refunding	4	19.66 Avg.	3.70
285,000	Margate City, N. J., Refunding	4	11.85 Avg.	4

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Denton, Texas	Initial Order
Madison, Wisconsin	Initial Order
Hanover, Pennsylvania	Initial Order
Starke, Florida	Initial Order
Oneonta, New York	Initial Order
KcKeesport, Pennsylvania	Additional Order
Akron, Ohio	Additional Order
Norristown, Pennsylvania	Additional Order
Abilene, Texas	Additional Order
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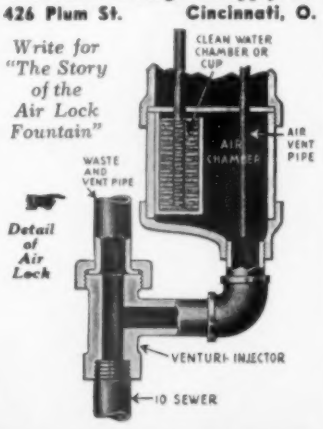

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Traffic Control and Facilitation

Conducted by Publications Committee, Institute of Traffic Engineers, 60 John St., New York
Charles G. Beckenbach, Chairman; Merwyn A. Kraft, Vice-Chairman; David M. Baldwin, Martin Bruening, Stephen Butterfield, Edgar F. Copell, John B. Ecker, Fred W. Fisch, Theodore W. Forbes, Milton Harris, E. Emmett Kirwin, Foster M. Kunz, Walter Matthews, Henry W. Osborne, I. S. Shattuck, Matthew Stelskt, Frederick Tarbox

Traffic-Signal Dictionary

Nomenclature Committee Report of Traffic Signalling Section, National Electric Manufacturers Association

THIS is the final report of the Nomenclature Committee, giving the list of terms applying to traffic-signal controllers, together with the definitions. This work was assigned to the Nomenclature Committee to clarify the number of different terms applying to certain parts of traffic-signal controllers. For many years past both the industry and the trade have used various terms, and the Committee undertook to tabulate the various terms in use, select the most appropriate one and write a definition.

Where several terms are in general use for the same thing, the preferred term is underscored in the list of definitions.

At the last meeting of the Traffic Signalling Section of NEMA, the Nomenclature Committee presented this list of definitions in substantially the same form as the attached, and the Committee as a whole approved the set of definitions with certain slight changes which have been made in the attached text.

It was recommended by the Committee and adopted by the group that these terms be placed in general use in descriptive literature, specifications, and correspondence, and that copies of these definitions be given nation-wide publicity and also transmitted to other organizations in the traffic-signalling field.

NOMENCLATURE COMMITTEE,
NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION.

K. W. MACKALL, Chairman
F. D. CROWTHER
I. J. MACK

Definitions Applying to Traffic-Signal Controllers

1. *Controller,* Control, Timer, Timing Switch.—A complete electrical or mechanical mechanism for controlling the operation of traffic signals; including the timer proper, necessary switches, relays, terminal board, etc., mounted in a weatherproof cabinet with lock and mounting attachments.

2. *Timer,* Automatic Timer, Timing Switch, Timing Mechanism, Controller Mechanism.—The automatic timing mechanism proper of a controller, including the timing dial or dials and the signal contacts.

3. *Manual Controller.*—A mechanism for controlling traffic signals by hand.

4. *Automatic Controller.*—An electrical, or an electro-mechanical, mechanism for controlling signals automatically.

5. *Auxiliary Manual Controller.*—A separate and distinct manual controller, attached to an automatic controller, by means of which the signals may be operated by hand when the automatic controller is removed.

6. *Manual Switch and Cord.*—A hand-operated electrical switch attached to an automatic controller, by means of which the controller may be operated by hand.

7. *Master Controller,* Master Timer, Supervisory Control, Master.—An automatic controller mechanism for supervising a plurality of secondary controllers.

8. *Secondary Controller,* Intersection Control.—An automatic traffic controller mechanism for operating the signals at an intersection under the supervision of a master controller.

9. *Combined Master and Secondary Controller.*—The combination of a separate master controller and a separate secondary controller mounted in a single cabinet or in two or more cabinets fastened together, ready for installation as a single unit.

10. *Secondary Controller with Master Supervisory Contacts.*—A secondary controller equipped with auxiliary contacts for checking the offset (reset) or beginning of the green interval, thus maintaining supervision over all secondary controllers in the group.

NOTE: One secondary controller with master supervisory contacts may be used to supervise the secondary controllers of a small installation.

11. *Pre-Timed Control,* Fixed-Time Control.—A type of automatic controller in which consecutive cycles are equal and are made up of constant intervals.

12. *Traffic Actuated Controller.*—A type of automatic controller which is actuated, in some cases limited, by impulses from individual vehicles or pedestrians, or both.

A. *Full Traffic Actuated Controller.*—A controller in which all of the intervals are initiated or modified by impulses from traffic.

B. *Semi-Actuated Controller.*—A controller in which only some of the intervals are initiated or modified by impulses from traffic.

13. *Synchronous Controller,* Synchronous Control, Synchronous Motor-Driven Timer, Synchronous Motor-Driven Timing Switch.—An automatic traffic controller operated by a synchronous motor, which will keep in step with the frequency of the supply circuit.

A. *Non-Interconnected Synchronous Controller.*—A synchronous motor-driven controller not equipped with remote reset contacts, intended for isolated operation with no provision for future interconnection.

B. *Future Interconnected Synchronous Controller.*—A synchronous motor-driven controller equipped with automatic reset contacts, relay jack for remote signal shutdown, and relay jack for remote flashing amber. Control equipped with all necessary mechanisms except remote relays so that controls may be interconnected at some future time.

C. *Interconnected Synchronous Controller.*—A synchronous motor-driven controller for interconnected operation equipped with single automatic reset, relay jack and relay for remote signal shutdown, relay jack and relay for remote flashing amber, and all necessary mechanisms for immediate interconnection.

14. *Induction Controller,* Induction Control, Induction Motor-Driven Timer, Induction Motor-Driven Timing Switch.—An automatic traffic signal controller driven by an induction motor.

15. *Isolated Controller,* Independent Control.—An automatic traffic signal control for a single intersection not in coordination with any other control.

16. *Coordinated Controllers,* Synchronized Controls.—Two or more automatic controllers capable of being operated with definite time interrelation.

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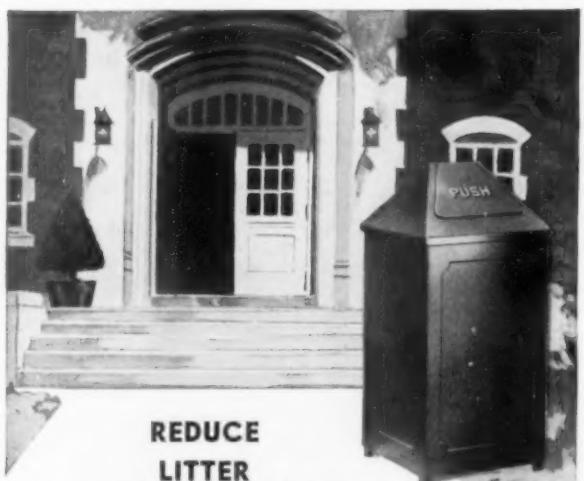

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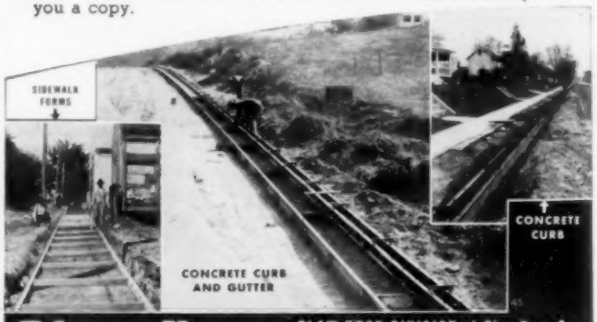

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A. *Interconnected Coordinated Controllers.*—Two or more coordinated controllers with definite time interrelation maintained or supervised by an interconnecting cable.

B. *Non-interconnected Coordinated Controllers.*—Two or more synchronous motor-driven coordinated controllers capable of maintaining definite time interrelation without interconnecting cable.

17. *Simultaneous System.*—A signal system in which all signals always give the same indication to a given street at the same time.

18. *Alternate Simultaneous System.*—A signal system in which alternate signals, or groups of signals, give opposite indications to a given street at the same time.

19. *Progressive System.*—A signal system in which the various signal phases controlling a given street display Go indications in accordance with a timing schedule to permit, as nearly as possible, continuous operation of groups of vehicles along a street at a predetermined rate of speed.

A. *Limited Progressive System.*—A signal system in which the various signal phases controlling a given street display Go indications in accordance with a timing schedule to permit, as nearly as possible, continuous operation of groups of vehicles along a street at a predetermined rate of speed. The timers in the limited progressive system are synchronous motor-driven not equipped with remote cycle change. Timers may be interconnected to give remote signal shutdown, remote flashing, remote emergency all-red, but no provision is made for remote time cycle change.

B. *Full Flexible Progressive System.*—A signal system in which the various signal phases controlling a given street display Go indications in accordance with a timing schedule to permit, as nearly as possible, continuous operation of groups of vehicles along a street at a predetermined rate of speed. Secondary controls connected by interconnecting cable with provision for remote signal shutdown, remote flashing, remote emergency all-red, and remote control of the time cycle.

20. *Time Cycle*, Cycle, Period, Total Time Cycle.—The time cycle is the number of seconds required for the time cycle dial to make one complete revolution, during which time the complete color sequence is displayed from beginning to end.

21. *Color Sequence*, Sequence, Order of Colors, Sequence of Colors, Signal Interval Sequence. The division of the time cycle into the required number of intervals for the control of traffic during any given time cycle.

22. *Interval, Period, Color.*—Any one of the several intervals which go to make up the proper color sequence of any given time cycle.

23. *Offset, Reset.*—The number of seconds that the green indication appears at a given signal after a certain instant used as a time reference base.

24. *Single Manual Reset.*—A mechanism applied to an automatic controller by means of which it is possible to manually adjust or check the beginning of the green.

25. *Single Automatic Reset.*—A mechanism applied to an automatic controller by means of which the reset or beginning of the green is checked automatically once every time cycle.

26. *Double Automatic Reset.*—A mechanism applied to an automatic controller by means of which it is possible to automatically select any one of two resets. The selection of the resets may be done either manually or by means of a time switch.

27. *Triple Automatic Reset.*—A mechanism applied to an automatic controller by means of which it is possible to automatically select any one of three resets. The selection of the resets may be done either manually or by means of a time switch.

28. *Time Cycle Dial, Total Period Dial.*—A mechanism applied to an automatic timer by means of which it is possible to adjust the time cycle.

NOTE: Time cycle dials are usually present only on induction motor-driven controls.

29. *Time Cycle Indicator*, Total Period Indicator. An indicating mechanism applied to an automatic timer for indicating in seconds or in speed in miles per hour the time cycle to which the control is operated.

30. *Timing Dial*, Timing Split Dial, Split Dial, Interval Split Dial, Interval Divider, Cycle Divider, Interval Dial.—A dial or similar mechanism on an automatic timer equipped with arms, pegs, keys, etc., by means of which it is possible to divide the time cycle into any desired number of intervals, check reset, interlock, etc.

31. *Single (Timing) Dial Timer.*—An automatic timer equipped with a single timing dial.

32. *Double (Timing) Dial Timer.*—An automatic timer equipped with two timing dials mechanically or electrically interconnected so that it is possible to select either of two color sequences, each with its own offset. The shift from the color sequence given by one dial to the color sequence given by the other dial to be accomplished remotely by means of either a hand-operated switch or a time switch.

33. *Triple (Timing) Dial Timer.*—An automatic timer equipped with three timing dials mechanically or electrically interconnected so that it is possible to select any one of three color sequences, each with its own offset. The shift from the color sequence given by one dial to the color sequence given by either of the other dials to be accomplished remotely by means of either a hand-operated switch or a time switch.

34. *Vehicular Movement*, Phase.—A movement in which one portion of vehicular traffic at an intersection moves when the rest of the vehicular traffic is stopped.

NOTE: With multi-circuit, multi-interval controls, it is important that the number of vehicular movements be specified because, when remote control features such as flashing and all-red are used, the number of relays required to give these auxiliary features is determined by the number of vehicular movements. On controls of two vehicular movements, one relay is required to set up either flashing or all-red; with three or four vehicular movements two relays are required to set up either flashing or emergency all-red; and with five vehicular movements three relays are required to set up either flashing or emergency all-red.

35. *Pedestrian Movement*, Pedestrian Interval.—One or more intervals occurring in a color sequence, which interval or intervals are allowed for the exclusive use of pedestrians and the interval clearance after the pedestrian movement.

36. *Out-of-Coordination*, Out-of-Step, Out-of-Synchronism.—A state existing between controls in a coordinated system during which the controls are not maintaining their proper time interrelation.

37. *Reset Contacts*, Re-synchronizing Contacts, Re-coordination Contacts.—Automatically operated contacts on a secondary control by means of which the reset or beginning of the green is automatically checked once each time cycle.

38. *Power Failure Relay*, Out-of-Synchronism Indicator, Out-of-Coordination Indicator, Power Failure Flashing Relay.—A relay in a secondary control which operates in case of power failure and turns the signal from normal operation to flashing operation, or which closes a circuit to an indication mounted on top of the cabinet.

39. *Power Failure Indicator.*—An indicator in a weatherproof enclosure mounted on top of a secondary control cabinet which, when illuminated by the power failure relay mounted within, indicates power has failed and that the control needs manual re-synchronization.

40. *Signal Shutdown Switch.*—A switch in an automatic traffic signal control operable by hand by means of which the signal lights are turned off.

41. *Time Switch for Signal Shutdown.*—A time switch installed in a traffic signal cabinet by means of which normal signal operation may be discontinued and restored on a predetermined schedule of daily operation.

NOTE: Standard time switches are provided with Saturday and Sunday omitting device if desired.

42. *Remote Signal Shutdown Relay.*—A relay installed in a secondary control so connected that when energized from a remote point normal signal operation may be discontinued, and the signal lights turned off.

43. *Remote Flashing Relay.*—A relay installed in a secondary control so connected that when energized from a remote point normal signal operation may be discontinued.

44. *Amber-Red Flash Terminals.*—Additional terminals installed in a traffic signal control so wired that by the in-

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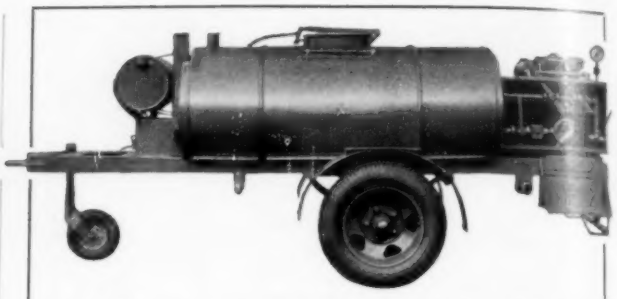

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change of jumpers flashing operation may be arranged to give either amber or red on the cross street or in the case of controls with 3, 4, and 5 vehicular movements, to give either amber or red on any of the secondary streets.

NOTE: Standard controls are always arranged to give flashing amber on the main street, and the additional terminals are supplied so that in the field it is possible to select either amber or red for streets of secondary importance.

45. *Radio Interference Filter*, Radio Interference Eliminator, Choke Coils, Choke Radio Interference Suppressor Coils and Condensers, Filter.—A combination of choke coils and/or condensers applied to flashing circuits only, for suppressing or minimizing radio interference.

NOTE: Many specifications make a blanket statement that controls must be free from all radio interference, which, of course, is not possible. Standard traffic signal practice has been limited to the application of radio interference suppressors to off-duty flashing circuits only. Under normal conditions it requires one or more choke coils and a condenser to suppress radio interference in any given circuit, and it is not practicable to apply these devices to all signal and control circuits on a modern multi-circuit, multi-interval timer, because these devices are quite large and costly. Signal and control circuits opening and closing 3 or 4 times every time cycle do not cause objectional radio interference.

46. *Remote Control Emergency Relay.*—A relay mounted within a traffic signal control which when energized from a remote point discontinues normal signal operation and displays either red in all four directions or one green light facing the movement of high-speed fire apparatus and red in the other directions.

47. *Jack Mounted Relay.*—A relay mounted within a traffic signal control which when energized discontinues normal signal operation and causes the signal to display some other predetermined signal operation such as lights out, flashing, or all-red; relay quickly removable without disturbing any wiring.

48. *Relay Jack*, Relay Position, Relay Sub-Base.—A set of terminals connected in a traffic controller circuit on which a remote control relay may be mounted.

49. *Space for Wiring for Time Switch:* (1) For Signal Shutdown; (2) For Off-Duty Flashing.—Provision and wiring in a traffic control so that a customer may install his own time switch. Specifications must state distinctly the function for which the time switch is to be used.

50. *Cabinet, Housing, Box.*—A weatherproof enclosure for housing the timer and panel, all of which together constitutes a controller.

Non-Aluminum Traffic Signals?

ALUMINUM and magnesium are two of the most important raw materials required for national defense, and currently the most difficult to obtain. Because of this, aluminum was put on a 25 per cent basis for civilian needs, effective March 1, 1941, and later on it may become even more difficult for non-defense industries to obtain aluminum. Some industries may not be able to get any aluminum or other metals vital to defense needs; other industries may be able to get aluminum in varying amounts from zero up to probably no more than 25 per cent of what they have been getting during normal periods.

The supply of zinc is equally inadequate, and its need is even more pressing for the manufacture of brass used for cartridges.

What about traffic signals and controllers? Is the control of street and highway traffic a civilian need only? Transportation and communication are vital aids to national defense.

Traffic signals release many police officers from the routine duty of controlling automobile traffic and permit their assignment to the protection of defense plants, etc.

Traffic control on the way to and from camps, cantonments, and forts is vital. Traffic signals are now called for by army authorities for installation at intersections on approaches to cantonments and forts.

The development of traffic control during recent years has made necessary two-, three-, four-, and five-way signals, and to the usual three-light indications it has been necessary to add also arrow indications and pedestrian WALK and WAIT lenses. The effectiveness of traffic control has been made possible by the light construction of die-cast aluminum signals and the standardization of units which the manufacturers of traffic-control equipment have made possible as a result of their close study of traffic problems in association with state and municipal traffic engineers. A real service to, and effective economy for, the public generally has been made possible by this close cooperation.

Traffic-signal equipment must not be regarded as a civilian need only, but, if the supply of aluminum is to be strictly limited, manufacturers of traffic signals will be forced to substitute iron or some other heavy metal for aluminum. Iron weighs three times as much as aluminum, and the cross-section of castings will, of necessity, have to be greater than those that are die cast. The substitution of iron for a one-way three-light signal may not be too objectionable, but when iron becomes necessary for two-, three-, four-, and five-way signals, other problems and hazards are involved; new problems of installation and equipment therefor, and of maintenance, will have to be met and solved. The problem, from the manufacturers' viewpoint, is still further complicated by the difficulties of re-tooling.

At the moment, it is too early to state definitely what action the Priorities Division of the Office of Production Management in Washington may take with respect to traffic-signal needs, but if the substitution of iron becomes necessary, the cooperation of all traffic engineers, police officials, and manufacturers is essential. The weight of the signal, once installed, will have less bearing. The effectiveness of the signal in operation is what counts.

Traffic signals will be needed more and more as an aid to national defense in the immediate future, whether made of cast iron, steel, or other material. Industry, engineers, and users are urged to cooperate to the fullest extent. This need is emphasized by Hawley S. Simpson, President, Institute of Traffic Engineers, in the following statement:

"Under a recent order of the Office of Production Management, aluminum cannot be supplied by manufacturers for any civilian use. During this emergency, purchasers of traffic-signal equipment may be unable to obtain traffic-signal control heads meeting the recently published ITE standard. These require that the housing, doors, and hoods be made of 'non-ferrous metal.' Generally aluminum is used for this.

"It is suggested that those using the ITE specifications append thereto a supplementary provision giving the manufacturer the alternative of bidding on equipment made of other material which may be jointly agreed upon by the purchaser and seller. It is not believed wise to specify in too great detail what other materials may be substituted for aluminum or other non-ferrous metals, inasmuch as shortages of tools and other alloys may require the use of what may be the only material available to a particular manufacturer at the time the signals are required.

"It is further suggested that before bids are called for, prospective purchasers confer with potential suppliers to discuss what modifications may necessarily be made in the specification to enable each of the manufacturers to bid on the specifications."

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I. E. S. Recommended Practice

Basis of Good Street Lighting

THE famous I. E. S. Code of Street Lighting, issued in 1930 and revised as of 1935, has again been revised and was published in the January, 1941, issue of *Illuminating Engineering* by the Illuminating Engineering Society. Economic considerations and the trend toward ever higher motor-vehicle speeds have induced an increase in the use of fixed lighting on lighted streets and in the extension of fixed lighting into unlighted streets. Anticipating that this trend will continue a long while before the goal of daylight equivalency in visibility shall be attained, it must be recognized that recommendations as to the amount of light to be supplied on roadways are likely to become outmoded in the near future. The present recommendations are rightly compromises between the ideal and the present practice, and to some extent are concessions to practicability.

The many and varying conditions of street and traffic which are found in the average community make it impracticable to set up lighting specifications for all local situations likely to be encountered in practice. Therefore, the committee has confined the subject matter in this edition to the fundamental principles of street illumination and to general specifications covering good street-lighting practice. Taking these criteria as a base, the committee believes that it will be possible for the engineer or street-lighting specialist to draw up a specification to meet any unusual street-lighting situation.

The major purposes of street lighting, as formulated by the Committee on Street and Highway Lighting, are:

(a) To promote safety and convenience in the streets at night through adequate visibility

(b) To enhance the community value of the street

(c) To increase the attractiveness of the street

Underlying all other objectives, the fundamental purpose of street lighting is to produce the illumination requisite for good visibility at night and, through good visibility, to promote safer use of streets.

Street lighting contributes effectively to the prevention of pedestrian and vehicular traffic accidents and of their resulting toll of human life, personal injuries, and economic losses. The contribution is proportional to the *effectiveness* of the street illumination in providing *visibility* adequate for accurate, certain, and comfortable seeing.

In addition to its value in reducing traffic accidents and deterring crime, good street lighting encourages development of business districts, enhances property values, and makes more effective use of the large investment in street and highway construction.

The average footcandle values of illumination recommended in the table are considered by the Illuminating Engineering Society's Committee on Street and Highway Lighting to be the minima that should be delivered on the street to provide a reasonable degree of safety, effectiveness, and convenience.

Experience has shown in many instances that illumination values higher than those given are justified by the increased safety, effectiveness, and convenience afforded to those using the streets at night. Although there are many street-lighting installations throughout the country which now exceed these values, the vast majority are totally inadequate to provide the visibility needed under the present night traffic conditions.

The illumination values given in Table A of Average Footcandles, Minimum for Night Traffic Safety, may be produced in a variety of ways, as by using larger lamps widely spaced and with higher mountings, or smaller lamps spaced more closely at lower mountings. Luminaire location may be varied over the roadway, and various types of equipment may be employed. Wider roadways of course call for provision of more light than is needed on narrow roadways. The occasion for the use of the smaller lamps, more closely spaced, will generally be found on forested streets. In any arrangement selected, a dominating consideration is the light-distribution characteristics of the luminaire to be used.

Each example shown in Table B illustrates one possible arrangement. In

TABLE A—ILLUMINATION FOR SAFETY

Street Classification	Volume of Vehicular Traffic (Maximum Night Hour, Both Directions)	Footcandles Per Square Foot on Street Between Curbs*		Average Between Curb and Property Lines**
		Average	Minimum	
Very light traffic	Under 150	0.1	0.02	0.05
Light traffic	150- 500	0.2	0.05	0.05
Medium traffic	500-1,200	0.4	0.1	0.1
Heavy traffic	1,200-2,400	0.8	0.2	0.25
Very heavy traffic	2,400-4,000	1.2	0.3	0.25
Heaviest traffic	Over 4,000	1.5	0.4	0.25

* These values apply where the pavement has reasonably favorable reflection characteristics. Somewhat higher footcandle values should be employed where the reflection characteristics of the pavement are unfavorable. A reflectance of approximately 10 per cent may be taken as the dividing line between the classifications "favorable" and "unfavorable." The gloss of the surface must also be taken into consideration. Where the traffic volume on a street is near the upper or lower limits of a given classification, the illumination may be modified accordingly.

** These values of illumination intensity on the sidewalks usually will be provided by lighting equipment which produces the recommended illumination intensities on the roadway. However, the requirements of visibility on sidewalks should be given due consideration when selecting the luminaires.

NOTE: Since a primary purpose of street lighting is to provide safe seeing for motorists and pedestrian, the specification of street lighting may eventually be in terms of visibility. Researches now in progress may afford a basis for such specification.

Tonight, and every night

L-M LIGHTING

is increasing visibility, decreasing accidents, protecting lives on streets and highways all over America . . . and saving many dollars annually by its economical maintenance. These photographs from many states are the proof . . . you get effective, modern lighting when you depend on L-M for "Everything You Need In Street and Highway Lighting".

LM

LINE MATERIAL COMPANY

Outdoor Lighting

Streets—Highways—Floodlighting

I. E. S. Recommended Practice

Basis of Good Street Lighting

THE famous I. E. S. Code of Street Lighting, issued in 1930 and revised as of 1935, has again been revised and was published in the January, 1941, issue of *Illuminating Engineering* by the Illuminating Engineering Society. Economic considerations and the trend toward ever higher motor-vehicle speeds have induced an increase in the use of fixed lighting on lighted streets and in the extension of fixed lighting into unlighted streets. Anticipating that this trend will continue a long while before the goal of daylight equivalency in visibility shall be attained, it must be recognized that recommendations as to the amount of light to be supplied on roadways are likely to become outmoded in the near future. The present recommendations are rightly compromises between the ideal and the present practice, and to some extent are concessions to practicability.

The many and varying conditions of street and traffic which are found in the average community make it impracticable to set up lighting specifications for all local situations likely to be encountered in practice. Therefore, the committee has confined the subject matter in this edition to the fundamental principles of street illumination and to general specifications covering good street-lighting practice. Taking these criteria as a base, the committee believes that it will be possible for the engineer or street-lighting specialist to draw up a specification to meet any unusual street-lighting situation.

The major purposes of street lighting, as formulated by the Committee on Street and Highway Lighting, are:

(a) To promote safety and convenience in the streets at night through adequate visibility

(b) To enhance the community value of the street

(c) To increase the attractiveness of the street

Underlying all other objectives, the fundamental purpose of street lighting is to produce the illumination requisite for good visibility at night and, through good visibility, to promote safer use of streets.

Street lighting contributes effectively to the prevention of pedestrian and vehicular traffic accidents and of their resulting toll of human life, personal injuries, and economic losses. The contribution is proportional to the *effectiveness* of the street illumination in providing *visibility* adequate for accurate, certain, and comfortable seeing.

In addition to its value in reducing traffic accidents and deterring crime, good street lighting encourages development of business districts, enhances property values, and makes more effective use of the large investment in street and highway construction.

The average footcandle values of illumination recommended in the table are considered by the Illuminating Engineering Society's Committee on Street and Highway Lighting to be the minima that should be delivered on the street to provide a reasonable degree of safety, effectiveness, and convenience.

Experience has shown in many instances that illumination values higher than those given are justified by the increased safety, effectiveness, and convenience afforded to those using the streets at night. Although there are many street-lighting installations throughout the country which now exceed these values, the vast majority are totally inadequate to provide the visibility needed under the present night traffic conditions.

The illumination values given in Table A of Average Footcandles, Minimum for Night Traffic Safety, may be produced in a variety of ways, as by using larger lamps widely spaced and with higher mountings, or smaller lamps spaced more closely at lower mountings. Luminaire location may be varied over the roadway, and various types of equipment may be employed. Wider roadways of course call for provision of more light than is needed on narrow roadways. The occasion for the use of the smaller lamps, more closely spaced, will generally be found on forested streets. In any arrangement selected, a dominating consideration is the light-distribution characteristics of the luminaire to be used.

Each example shown in Table B illustrates one possible arrangement. In

TABLE A—ILLUMINATION FOR SAFETY

Street Classification	Volume of Vehicular Traffic (Maximum Night Hour, Both Directions)	Footcandles Per Square Foot on Street Between Curbs* Average	Footcandles Per Square Foot on Street Between Curbs* Minimum	Average Between Curb and Property Lines**
Very light traffic	Under 150	0.1	0.02	0.05
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Medium traffic	500-1,200	0.4	0.1	0.1
Heavy traffic	1,200-2,400	0.8	0.2	0.25
Very heavy traffic	2,400-4,000	1.2	0.3	0.25
Heaviest traffic	Over 4,000	1.5	0.4	0.25

* These values apply where the pavement has reasonably favorable reflection characteristics. Somewhat higher footcandle values should be employed where the reflection characteristics of the pavement are unfavorable. A reflectance of approximately 10 per cent may be taken as the dividing line between the classifications "favorable" and "unfavorable." The gloss of the surface must also be taken into consideration. Where the traffic volume on a street is near the upper or lower limits of a given classification, the illumination may be modified accordingly.

** These values of illumination intensity on the sidewalks usually will be provided by lighting equipment which produces the recommended illumination intensities on the roadway. However, the requirements of visibility on sidewalks should be given due consideration when selecting the luminaires.

NOTE: Since a primary purpose of street lighting is to provide safe seeing for motorists and pedestrian, the specification of street lighting may eventually be in terms of visibility. Researches now in progress may afford a basis for such specification.

WESTINGHOUSE supplies the answer

Westinghouse Reflectolux Sr. Luminaires provide safe driving visibility on the Arroyo Seco Boulevard between Los Angeles and Pasadena, California.

Westinghouse Reflectolux Sr., the unit used on new California thoroughfare.

New Pacific Coast Thoroughfare Lighted by Westinghouse Luminaires

Adding to an established nationwide prestige for safe, modern highways, the state of California and adjacent municipalities north of Los Angeles have taken another forward step with completion of the Arroyo Seco Parkway connecting Los Angeles and Pasadena.

A total of 260 Westinghouse Reflectolux Sr. luminaires with 25-foot mounting height supplied the answer to properly illuminate a heavily traveled five-mile stretch of this new thoroughfare. Units with Sodium and Mercury Vapor lamps are used as warning signals at hazardous points while those equipped with incandescent lamps provide Traffic Safety Lighting over the intervening stretches.

The services of experienced Westinghouse Lighting Engineers are always available to communities considering street and highway lighting. Ask your nearest Westinghouse Lighting Specialist for "Benefits of Traffic Safety Lighting," B-2189. Or write the Lighting Division, Westinghouse Electric & Manufacturing Company, Edgewater Park, Cleveland, Ohio.

Westinghouse Lighting Equipment

determining a street-lighting plan, the arrangement which will accomplish the desired results in the most effective manner should be selected.

The minimum level of illumination that should be provided on primary and secondary business streets should never be less than the average footcandle valuations specified for traffic thoroughfares which carry the same volume of traffic.

The illumination on residential streets is primarily required for general protective and police purposes. Therefore, ordinarily it need not exceed 0.1 average footcandle on street and 0.05 on sidewalk surfaces.

Industrial streets traverse wholesale and manufacturing sections of a community. The average intensity required in these areas for general property protection and police purposes, except on traffic thoroughfares, ordinarily need not exceed that recommended for very light traffic streets, i.e., 0.1 footcandle on the street and 0.05 footcandle on the sidewalks. If these areas contain factories which have night operations,—a condition becoming more prevalent with the defense program,—more light will be needed to protect pedestrians.

More accidents occur at street intersections than at any other one location of our street systems, and the impairment of visibility by darkness greatly increases the hazards of traffic conflict at intersections. The street-lighting classification of intersecting streets indicates in a general way the illumination that may be required at the intersection. In general, it is recommended that the level of illumination provided at the average rectangular or diagonal street intersections should be at least equal to the sum of the illumination values herein recommended for the two streets which form the intersection. Ordinarily, the amount of illumination provided at complex intersections should be equal to that recommended herein for very heavy traffic.

The standard of illumination that should be provided for boulevards and park-drives in urban areas should be the same as the average footcandle valuations recommended for streets carrying the same volume of traffic. It is considered good practice to design the lighting units for these installations so that they will harmonize with the general surroundings.

Where traffic-dividing strips or parkways are built into a boulevard, park-drive, or other street, it will be necessary to give due regard to the width, location, design, and contour of these divisional strips and the landscape plantings on them when designing the lighting requirements. It is generally best to determine the lighting requirements for each roadway separately.

TABLE B—HOW TO ATTAIN SAFETY ILLUMINATION

Street Classification*	Lamp Lumens	Mounting Height (Feet)	Spacing Measured Along Middle Line of Street (Feet)
Very light traffic	1,000	15	90-110 staggered
	2,500	20-22	130-170 "
	4,000	25-30	200-250 center
Light traffic	2,500	16-18	100-120 staggered
	4,000	20-25	130-170 "
	6,000	22-25	130-170 "
Medium traffic	6,000	20-25	100-120 staggered
	10,000	22-27	130-170 "
	15,000	25-30	137-170 "
Heavy traffic	10,000	24-28	100-150 opposite
	10,000	24-28	75- 90 staggered
	15,000	24-28	150-180 opposite
Very heavy traffic	15,000	25-30	100-150 opposite
Heaviest traffic	15,000	25-30	100 opposite

* Because of greater street widths, larger lamps or closer spacings than shown usually are required on business streets to produce desired results. Among the foregoing the larger lamps or the closer spacings are appropriate on business streets.

Alleys should be lighted to a degree sufficient for police purposes. Where alleys are used for vehicular trafficways, 1,000-lumen lamps may be installed at spacings not greater than 200 feet. Close spacings are desirable where there are numerous garages along the alley, and also in alleys in business districts. Lighting should be provided at entrances, exits, and intersections of public alleys.

Item after item of statistics adds to the proof that good street lighting means a lower accident rate. In the classic case of Detroit in 1931, the money saved by curtailing the street-lighting service was over-spent on increased hospital costs borne by the municipal government. It has been said that if the full cost of night accidents which good lighting would have prevented were paid out of taxes, the taxpayers would demand good street lighting as a necessary municipal economy. The appalling toll of personal injuries and the taking of lives on our public streets is a grave reflection on the general lack of consideration given to the fundamental requirement for safety on the streets at night through adequate visibility. There are, however, hopeful signs that this condition is becoming more and more recognized by numerous civic organizations, the weight of whose opinions and convictions will ultimately bring about constructive action by the responsible public authorities.

Like all right things, good street lighting is inevitable, and the recommendations of street-lighting practice sponsored by the Illuminating Engineering Society define what constitutes good street lighting, its importance to public safety, and how to have it.

Copies of "Recommended Practice of Street Lighting 1940" may be obtained from the Illuminating Engineering Society, 51 Madison Avenue, New York.

Protective Lighting in Stormy Weather

WE SHOULD LIKE to make one or two comments on D. H. Tuck's talk on good practice in protective lighting, reported in the March, 1941, issue of THE AMERICAN CITY. He mentions an average illumination along boundary fences of 0.15 to 0.25 footcandle. We are of the opinion that, while this level of illumination might possibly be fairly adequate under the most favorable weather conditions, such protective lighting systems should be designed to take care of the most unfavorable and adverse weather conditions, if they are satisfactorily to fulfil their purpose.

Consequently, our recommendations are based more on 0.5 footcandle average along such boundary fences. In fact, with the 150-foot linear spacing which Mr. Tuck mentions, together with a 6,000-lumen lamp used in one of our Form 79-R luminaires with a Holophane refractor globe, we actually produce an average illumination of from 0.45 to 0.55 footcandle along such a boundary fence, depending on whether a 40-foot or a 20-foot width of area is being considered. Again, if we would utilize a 10,000-lumen lamp in this same luminaire, on a 200-foot linear spacing—mentioned as a possibility—we would actually get from 0.54 to 0.6 footcandle average over a 40-foot or 30-foot wide path.

R. M. SWETLAND,
General Electric Co., Schenectady, N. Y.

Be Sure of Adequate Lightin

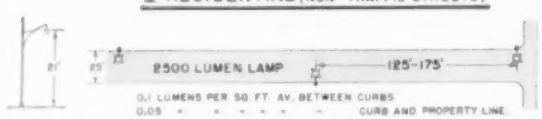
USE THE NEW I.E.S. STANDARDS WITH GENERAL ELECTRIC LUMINAIRES

The new *Recommended Practice of Street Lighting—1940* makes it easy to specify adequate lighting with assurance that it will conform to the best modern practice of providing the accurate, split-second seeing essential to night-time safety. Since obstacles are most frequently seen on the roadway by silhouette, the background must be brighter than the object, and the most satisfactory condition is that of uniform pavement brightness. The revised recommendations are the result of exhaustive studies to determine the correct luminaire design, mounting height, spacing, and illumination levels to provide a substantially uniformly bright pavement surface to a motorist driving along the lighted roadway.

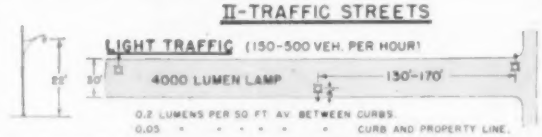
RECOMMENDED PRACTICE OF STREET LIGHTING—1940

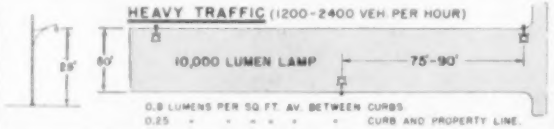
ILLUMINATING ENGINEERING SOCIETY AVERAGE RECOMMENDATIONS

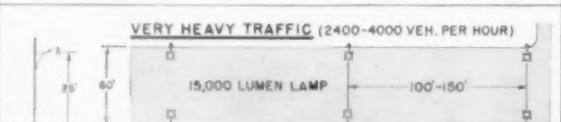
I-RESIDENTIAL (NON-TRAFFIC STREETS)



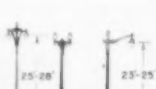
II-TRAFFIC STREETS






VERY HEAVY TRAFFIC (2400-4000 VEH. PER HOUR)
15,000 LUMEN LAMP
100'-150'
1.2 LUMENS PER SQ. FT. AV. BETWEEN CURBS.
0.25 " " " " " " CURB AND PROPERTY LINE.

III-RETAIL BUSINESS



LAMPS:- 6000 TO 25,000 LUMEN SIZE.

SPACING:- OPPOSITE OR STAGGERED.

AV. ILL. LEVELS:- 0.8 TO 1.5 FOOT-CANDLES, DEPENDING ON BOTH VEH. AND PEDESTRIAN TRAFFIC, NEVER LESS THAN LEVELS SPECIFIED FOR TRAFFIC STREETS CARRYING SAME VOLUME OF TRAFFIC.

RESULTS FROM G-E EQUIPMENT (CALCULATED)

AVERAGE INITIAL LUMENS PER SQ. FT.

LUMINAIRE	SPACING SHORT STREET	SPACING SHORT SIDEWALK	SPACING LONG STREET	SPACING LONG SIDEWALK
72-R OR 79-R	0.28	0.26	0.20	0.19
72 (SHADING REFL.)	0.25	0.30	0.18	0.21
79-R	0.40	0.36	0.30	0.27
79-D	0.30	0.32	0.23	0.25
75-R	0.70	0.53	0.58	0.42
75-D	0.52	0.51	0.41	0.41
79-R	1.20	1.00	1.02	0.84
79-D	1.00	0.99	0.83	0.82
81-D	0.89	1.04	0.75	0.87
M-2 (SODIUM)	0.88	1.13	0.73	0.94
81-D	1.82	2.16	1.21	1.44
32 (WITH REFR.)	1.51	1.88	1.01	1.25

NOTES:- A DISTANCE OF 15FT. BETWEEN CURB AND PROPERTY LINE USED IN ABOVE CALCULATIONS.

TRAFFIC VOLUME IS FOR MAXIMUM NIGHT HOUR COUNT BOTH DIRECTIONS.

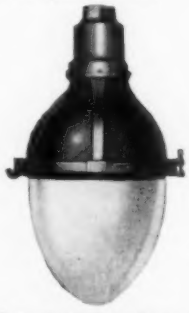
Additional copies of this chart may be obtained from General Electric. Ask for GES-2526.

This chart covers only I.E.S. recommended averages. Character of specific street and of pedestrian and vehicular traffic may justify a modification. Read the complete "Recommended Practice of Street Lighting—1940," obtainable from Illuminating Engineering Society, 51 Madison Ave., New York. The figures "Results from G-E Equipment" were prepared by G-E engineers and approval of the I.E.S. Street and Highway Lighting Committee is not intended or implied.

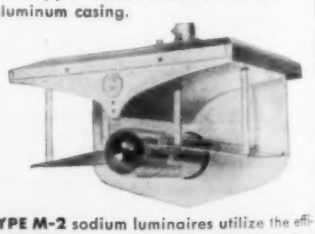
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

FORM 79 luminaires, delivering 80 per cent more light on the roadway than the best previous design, has the correct candlepower distribution for effective visibility on most traffic streets. A long life of economical service is assured by spun-sealed glassware, bug-proof joint between hood and reflector, and stepped reflector to reduce temperature at the lamp stem.

FORM 72 with wet-process porcelain insulator is ideal for high-voltage, straight-series installations. Improved mechanical and electrical features include compression support of the porcelain and snubbing the entrance cable in a porcelain channel for longer insulation life and elimination of open circuits at the luminaire. Available with Form 79 optical system.



FORM 81 luminaires embody the well-known, efficient, light-distribution characteristics of the Form 79 in an ornamental design applicable for lighting business streets and heavily traveled thoroughfares where larger lamps and higher levels of illumination are required. This unit has the stepped reflector housed in a die-cast aluminum casing.



TYPE M-2 sodium luminaires utilize the efficient 55-lumens-per-watt sodium lamp in a special combination of plane and parabolic reflectors. The horizontally arranged lamp provides a wide band of specularly reflected light on the road surface. The characteristic caution color of sodium adapts it to dangerous locations and assists in directing through traffic along main traffic arteries.

GENERAL ELECTRIC

Modern Traffic Safety Lighting on Broadway, Aurora, Ill.

Aurora Sees with Modern Eyes

By MATTHEW C. SIELSKI
Assistant Traffic Engineer,
Chicago Motor Club

STATE motor-fuel tax funds were used by the city of Aurora, Ill., to widen and repair Broadway, while the merchants and property owners paid for new luminaires and lighting standards.

These General Electric 81-D luminaires, using 750-watt incandescent lamps, are mounted on bracket-arms atop Union Metal standards 25 feet from ground to light center. The standards are spaced 96 feet apart and opposite.

The old system on Broadway consisted of an opal globe containing a 200-watt lamp, mounted at an elevation of 12 feet, spaced 55 feet apart and opposite. The G.E. Evaluator rating for this was the figure 4.3. The Street and Highway Lighting Committee of the Illuminating Engineering Society recommends this degree of lighting as minimum for streets carrying about 325 vehicles per hour. As a matter of fact, as many as 723 vehicles used Broadway during a darkness hour. Improvement in the street lighting was very much needed.

In contrast to the 4.3 rating was the figure 16 recorded for the new installation. This degree of lighting is the minimum for streets carrying as high as 4,000 vehicles. The new equipment correctly placed provides nearly four times the visibility of the old globes. The effectiveness of the new units was aided by a new asphalt pavement on Broadway, replacing the car tracks embedded in brick with asphalt surfaces on both sides of the brick.

We have made tests in cities throughout Illinois, and find Aurora lighting superior to any other in the state. Not only has this installation made a marked improvement in the appearance of the business district, but it can be expected to reduce the night accident toll. In 1940 there were 35 day accidents and 35 night accidents. As day traffic is almost three times that of night traffic, there were evidently too many night accidents.

Because modern traffic safety lighting has saved lives, the Chicago Motor Club, representing 100,000 motorists, is vitally interested in these modern installations, and congratulates the business men and city officials of Aurora for their progressive spirit in having this lighting system installed.

Sodium Vapor for Industrial Area

SODIUM LIGHTING is finding increased application along outlying city traffic arteries and by-pass routes, as illustrated by a 3½-mile system installed by the Ohio Public Service Co. along East 28th and 31st Streets and Grove Avenue in Lorain, Ohio. These streets pass through an industrial area where traffic density is high during the late evening and early morning hours, owing to changing steel-mill shifts.

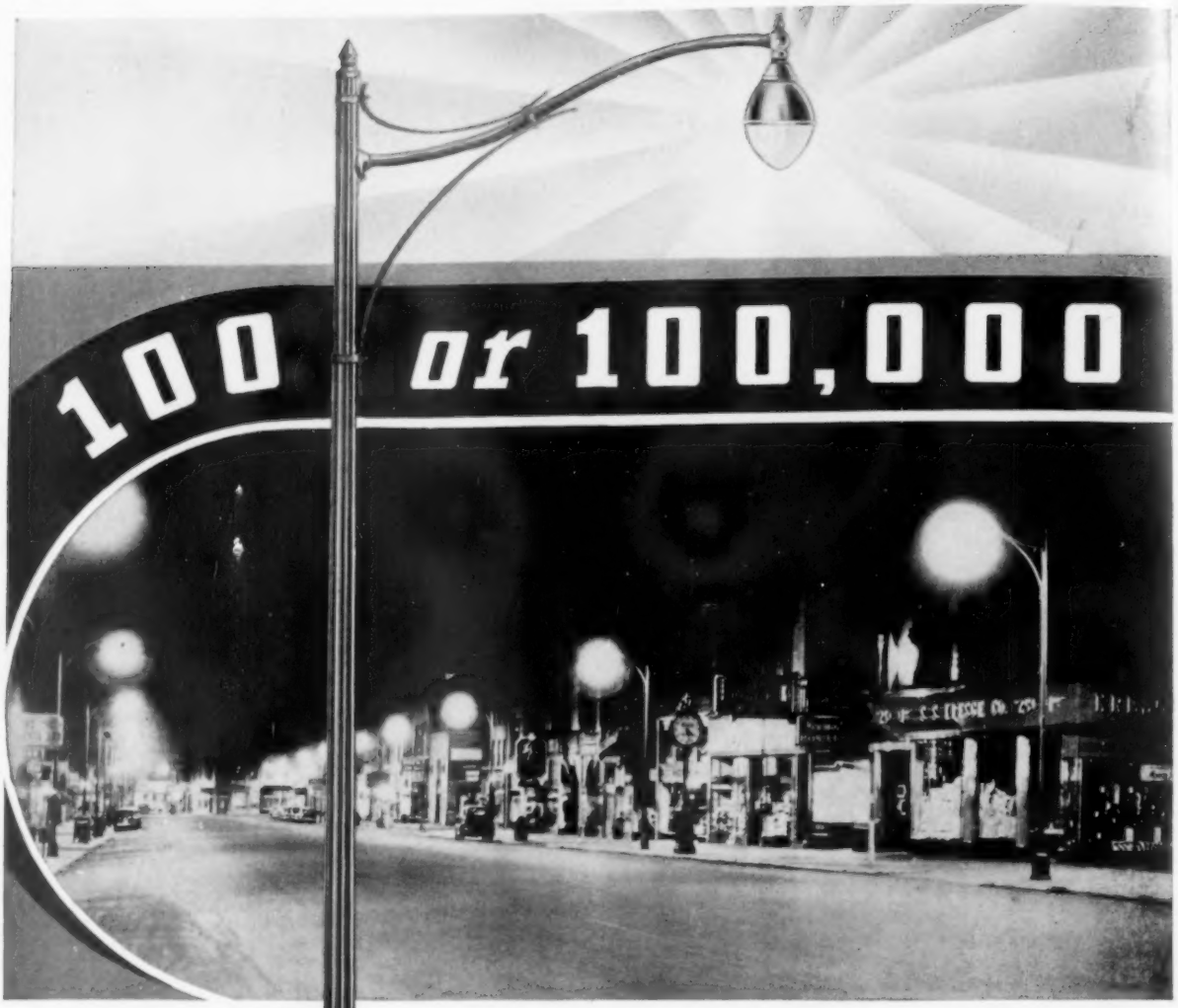
The sodium luminaires are of the open type, employ 10,000-lumen sodium lamps operated in a horizontal position, and have General Electric airplane-shaped reflectors. They are mounted on bracket arms on Union Metal standards 25 feet above the pavement and spaced 200 feet apart in a staggered arrangement.

Four Better Street-Lighting Installations in Albany

ALBANY, N. Y., is boasting four new street-lighting installations which have improved both the safety and the speed of traffic flow and the appearance of the city at night. For two miles on Washington Avenue, from Northern Boulevard to Manning Boulevard, Union Metal pendant-type poles have been erected and equipped with 6,000-lumen General Electric incandescent luminaires. The luminaires are mounted 23 feet to light source, and the units are spaced 150 feet apart, staggered, on this 60-foot street carrying a secondary volume of traffic.

A similar installation, but with 4,000-lumen lamps spaced 100 feet apart, staggered, has been erected for a mile along 40-foot Broadway, from Livingston Avenue to the north city line. The same type of installation has been constructed for two miles on Clinton Avenue from North Pearl Street to Manning Boulevard.

The dangerous intersection of Loudonville Road and Northern Boulevard has been tamed by the installation of eight 10,000-lumen sodium-vapor lamps with four more to be installed. Sodium lamps are increasingly recognized as accident-prevention agents.



Jackson, Mich.

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UNION METAL
***STEEL* STANDARDS**
are available in a wide range of types and sizes. Let our engineers analyze your street lighting problem. They may help you to save dollars as well as lives. Write for Catalog No. 71.

YOUR COMMUNITY NEEDS MODERN STREET LIGHTING

● Dark streets are dangerous streets regardless of the size of the community. Small towns and large cities alike contribute yearly to the terrifying total of after-dark fatalities. One way to reduce this needless slaughter has been found in modern street lighting. It works every time, and the cost is infinitesimal compared to the savings in lives and property.

Wherever modern street lighting is used to advantage, you will usually find that Union Metal *steel* standards play an important role in its success. Designs based on 30 years' experience insure mountings of the proper height and strength for all types of luminaires. All-steel construction means longer life and lower maintenance. Beauty has been built into these standards, too. Their sleek, tapered lines—ornamental or plain—are always in good taste and meet the appearance requirements for both residential and business sections.

UNION METAL

THE UNION METAL MANUFACTURING CO.
CANTON, OHIO

Prepared by
FRANK B. WILLIAMS
Author of "The Law of City Planning and Zoning"

Zoning and Planning Notes

With the cooperation of
EDWARD M. BASSETT
Author of "Zoning" and of "The Master Plan"

Zoning Variance—Conditions

CONNECTICUT.—*Youngs v. Zoning Board of Appeals of City of Norwalk*, Supreme Court, January 10, 1941, reported in 17 Atl. 2d, 513.—The zoning ordinance of the city of Norwalk provides for the granting of a permit for the erection of a gasoline filling station in a business zone on a lot within 200 feet of a church, with a seating capacity of 300 people, only upon permission of the Zoning Board of Appeals, under appropriate conditions and safeguards. The Board in this case granted the permit without imposing any conditions or safeguards. Such action, in the opinion of this Court, was improper and made the grant voidable on appeal.

EDITOR'S NOTE.—If the Board could reasonably have decided that in this case no conditions or safeguards were necessary, and had stated the facts upon which this conclusion was based, it would seem that their decision would have been valid.

Spot Zoning—Economic Gain

MASSACHUSETTS.—*Leahy v. Inspector of Buildings*. Supreme Court, January 23, 1941, reported in 31, N. E. 436.—The Common Council of the city of New Bedford in amending the zoning ordinance of the city by establishing as a business district a single corner lot located in a residential district, acted in an arbitrary and unreasonable and consequently invalid manner.

The establishment of zoning districts is based upon the physical characteristics of sub-standard areas and their suitability for use for certain purposes in view of the present and future requirements of the public health, morals, safety and welfare.

A city council is empowered to amend a zoning ordinance when the character and use of a district or the surrounding territory have become so changed since the original ordinance was enacted that the public health, safety and welfare would be promoted by the change; but mere economic gain to the owner of a comparatively small area is not sufficient to invoke an exercise of its amending power for the benefit of such owner. Decisions to this effect are cited. It is true that these decisions deal with the actions of administrative boards in granting variances in the applications of zoning ordinances, and that there is a difference between the variations in the application of an ordinance and in the enactment of an ordinance, yet these cases are significant in illustrating the permanence that is ordinarily to be attributed to existing ordinances. That feature of zoning ordinances is emphasized by the statutory requirements which must be complied with in order to affect existing regulations.

There are many decisions holding that the action of a city council in establishing as a business district a single corner lot located in a residential district is unreasonable.

The auditor found that the operation of this amendment will not result in uniformity of regulations and restrictions for zones, districts or streets having substantially the same character. The lot has never been used for business. No business area is any nearer to this lot than it was when the zoning ordinance was first enacted. It remains in a long-established residential district where no substantial changes in its character or use have occurred since the zoning ordinance first became effective. The lot is not on the edge of a residential district. The effect of the amendment is to single out one lot located within what is essentially a residential district and impose restrictions upon this lot that are less onerous than those imposed upon the remaining portions of what is really the same zoning district. The amendment, therefore, is not authorized by the zoning enabling acts and is void.

Junk Yards—Classification

NEW JERSEY.—*Varsallo v. Board of Commissioners of City of Orange*, Court of Errors and Appeals, October 10, 1940, reported in 15 Atl. 2d, 603.—A city ordinance regulated the size of premises to be used as a motor-vehicle junk yard, and required the yard to be completely enclosed with a fence 8 feet high of such construction that the interior of the yard could not be viewed from the exterior.

Held that the fact that this ordinance is directed against motor-vehicle junk yards and not against other junk yards "indicates that some consideration other than public safety led to its passage"; and for this and other reasons the ordinance was held an unreasonable exercise of power, and unconstitutional and void.

Zoning Legislation—Density of Population

NEW YORK.—*City of Albany v. Anthony*, Supreme Court, July 9, 1940, reported in 174 Misc. 470, 21 N. Y. S. 258.—By the zoning enabling legislation of the state of New York, the city of Albany was authorized to regulate and limit the density of population "in any given area" within the city by districts. Under this legislation the city passed a zoning ordinance which limited the number of families in various districts per acre on any given lot, and also provided that "the area of no plot . . . shall be deemed to extend more than 100 feet back from its street front."

The defendant, Anthony, was the owner of premises consisting of two apartment houses, having four apartments in each house, two on the first floor and two on the second floor. He now wishes to alter these houses by constructing an additional apartment in the basement of each of them. The city is seeking to enjoin him from so doing, on the ground that the area within 100 feet of the front line of these premises is not sufficient to comply with the ordinance.

It is conceded that, if the land more than 100 feet from the street be included in the reckoning, it will be sufficient to be in compliance with the ordinance; and the defendant claims that this 100 feet limitation is void, not being a limitation of density authorized by the New York State statute.

The Court holds that the 100 feet provision is valid. The power to regulate is not directed to be exercised in conformance with acres, square yards, or square feet, but is only directed to areas; and the method adopted by the city, not being arbitrary, or discriminatory or unreasonable, is in conformance with the statute. It is obvious that this method does tend to regulate density of population.

Zoning Ordinance—Estoppel

NEW YORK.—*Boardwalk and Seashore Corporation v. Murdock, Supreme Court*, reported in 22 N. Y. S. 611 (1940).—With relation to a zoning amendment which by its terms would prevent the petitioning corporation from putting its property to a certain use (not specified in the case as reported), the Court says in part:

"Equity and justice demand that vested rights of property owners be held *sacred*. The claim that originally petitioner failed to comply with the regulation then existing by obtaining a certificate of occupancy and for that reason cannot now urge a continued use beginning prior to enactment of the [amending] ordinance in question, or in other words cannot assert the claim of vested rights, may not be sustained. Petitioner has enjoyed the present use since February, 1925, continuously and without challenge of any kind from . . . the city of New York, any property owner or other person. The use has been open, notorious and, by reason of its inaction, with the tacit consent of the city of New York. It is also apparent that an application for such permission made in these early days would have received favorable attention by the authorities. . . . No valid objection could have been raised to its issuance. Under the circumstances respondents must be estopped from setting up that technical irregularity."

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Municipal Law Notes and Decisions

Prepared by National Institute of Municipal Law Officers, Washington, D. C.
Charles S. Rhyne, Executive Director, and John A. McIntire, Consultant

Non-Resident Discrimination

A license fee ordinance of the city of Menlo Park., Calif., exacting $20 for non-resident and $10 for resident painting contractors was upheld against the attack that it violated Federal and state constitutions as an arbitrary discrimination against non-residents. *Siversten* v. *City of Menlo Park*, 2 Cal. Dec. 141 109 Pac. (2d) 928, (Jan. 31, 1941).

The Court recognized the general proposition that: "If discriminatory legislation is arbitrary, unreasonable and passed for the sole purpose of creating a protective tariff for the benefit of business located in the particular municipality, it is unlawful."

The growing consciousness of a need for national economic unity and solidarity as a defense measure as well as the activity of publicists on the subject of Trade and Market Barriers has again focused attention on the application of local legislation to non-residents. See 16 Ind. Law J. issue for December, 1940: April, 1941, issue of *Law and Contemporary Problems;* May, 1941, issue of *The George Washington Law Review.*

Two recent decisions in Kentucky rendered on the same day as the California decision above reach opposite results, but by comparison shed some light on a problem full of inconsistent decisions. *Johnson* v. *City of Paducah*, 147 S. W. (2d) 721 (Ky. 1941) upheld a license tax of $5 exacted from persons operating a motor vehicle in the city, and specifically providing for collection from residents and non-residents alike. *Davis* v. *Pelfrey*, 147 S. W. (2d) 723 (Ky. 1941), however, invalidated the similar ordinance of Jackson City because it applied to non-residents only and made no provision for exaction of a similar fee from residents. The Court said the ordinance was violative of the equal protection clause of the Federal Constitution and expressly distinguished the city of Paducah case as indicated.

A North Carolina case in 1940 invalidated an ordinance levying a tax on wholesale merchants who used the city streets for delivery of goods by truck, holding that the ordinance was discriminatory as between residents and non-residents. *C. D. Kenny Co.* v. *Town of Brevard*, 217 N. C. 269, 7 S. E. (2d) 542 (1940). That Court said: "The erection of trade barriers between cities and towns by the power of taxation may not be extended beyond constitutional and statutory limits." See also *Best & Co.* v. *Maxwell*, 61 Sup. Ct. 334 (1941) (invalidating a state statute because of discrimination against non-residents). See Lockhart, "State Tax Barriers to Interstate Trade" (1940), 53 Harv. L. Rev. 1253.

On the other hand, a city does have power to require under a tax measure that the non-resident pay his way, even if he is in interstate commerce. See *McGoldrick* v. *Berwind-White Coal Co.*, 309 U. S. 33 (1940). And a non-resident should not be able to claim exemption from a local police or regulatory measure which is essential for the protection of the local public. See *American Baking Co.* v. *City of Wilmington*, 19 N. E. (2d) 172 (Ill. 1938), and *The Emporium* v. *City of San Mateo*, 177 Cal. 622; *California Fireproof Storage Co.* v. *City of Santa Monica*, 206 Cal. 714; *Crosswell & Co.* v. *Bishopville*, 172 S. E. 698.

It would seem that a rational approach to the dilemma of barrier or tariff wall effect of a local law on one hand, or equal distribution of burdens of local government or effective protection on the other hand, would require: (1) recognition that a local measure otherwise properly adopted is valid unless it can be affirmatively shown to have an economically injurious barrier effect; (2) the judicial review of the barrier effect may be allowed as to (a) discrimination as an arbitrary classification; (b) confiscation of property; (c) violation of equal protection or privileges and immunities clause; (d) discrimination against interstate commerce.

In general it may be said that no discrimination under taxing or police power may be made against non-residents as an end in itself to carry into effect a "buy at home" philosophy or any other protective policy. *In re Hart*, 36 Cal. App. 627; *City of Watertown* v. *Rodenbaugh*, 98 N. Y. Supp. 885 (1906); *City of Saginaw* v. *Saginaw Circuit Judge*, 106 Mich. 32 (1895).

Local chain-store taxes have been great offenders in this connection. See *Kroger Grocery and Baking Co.* v. *St. Louis*, 341 Mo. 62, 106 S. W. (2d) 435 (1937); *Great Atlantic and Pacific Tea Co.* v. *City of Columbus*, 189 Ga. 458, 6 S. E. (2d) 320 (1939); *City Council of Augusta* v. *Southern Stores, Inc.*, 189 Ga. 618, 7 S. E. (2d) 181 (1939); *Great Atlantic and Pacific Tea Co.* v. *Board of Commissioners of Camden*, 4 A. (2d) 16 (N. J. 1939). Cf., *Fredericksburg* v. *Sanitary Grocery Co.*, 190 S. E. 318, 110 A. L. R. 1195 (Va. 1937); and *Safeway Stores* v. *Portland*, 149 Or. 581, 42 P. (2d) 162 (1935).

The discriminatory effect of a local law, however, is not always evident on the face of the ordinance. While the Court will usually sustain an ordinance which has a legal basis, regardless of its economic policy, *Nebbia* v. *People of New York*, 291 U. S. 502 (1935); in one case the effective strategy of counsel succeeded in presenting a case to the Court calling for invalidation of a license fee ordinance ostensibly applicable to resident and non-resident alike. *Southern Linen Supply Co.* v. *City of Corbin*, 272 Ky. 787, 115 S. W. (2d) 321 (1938). In this case the ordinance required anyone conducting a linen supply service in the city of Corbin to pay a license fee of $200 yearly. The ordinance was applicable alike to residents and non-residents. Plaintiff was a non-resident, and on trial was able to prove by the admission of his only resident competitor, put on the witness stand, that the resident was actually charged only $45 as a license fee instead of the $200. The Court held the ordinance as applied and as intended by the legislators was an arbitrary discrimination against non-residents.

As a practical illustration of the need for a local protective measure making use of legitimate local power to classify non-residents as such for the purpose of protective police measures, see *National Institute of Municipal Law Officers*, Opinion Bulletin No. 3, Report No. 30.

For other phases of this general problem see: The American City, March, 1940: p. 111, and April, 1940, p. 137.

Census—Classification by Population

Where no method for determining population for classification purposes is set out by state law, the last decennial Federal census will be taken as the official count. *Hardin* v. *Jefferson County, Mo.*, 147 S. W. (2d) 643 (Mo., Feb. 14, 1941).

Counties—Authority of County Attorney to Hire Detectives

Where a county attorney acts on his own authority and with no special authorization from the county commissioners, the county is not liable for expenses incurred in the services of detectives. *Watts Detective Agency* v. *Inhabitants of Sagadahoc County*, 18 A. (2d) 308 (Me., Feb. 19, 1941).

Elections—Rejection of Signatures to Petition by a Clerk

Under a statute requiring the municipal clerk of the city of Bayonne to call a special election on the question of adoption of the manager form of government on a petition of legal voters not less than 15 per cent of those who voted at the last general election, the action of the clerk in rejecting signatures of those who had not voted at the last general election was improper. *Wright* v. *Lee*, 15 A. (2d) 610 (N. J. 1940).

Eminent Domain—Requirement That Negotiation for Purchase Be Made

An effort to acquire utility property by purchase is a condition precedent to power to acquire by eminent domain, and an attempt to acquire other property than that sought to be condemned does not satisfy the requirement. *Indiana Service Corporation* v. *Town of Flora*, 31 N. E. (2d) 1015 (Ind., Mar. 3, 1941).

Food—Inspection—Licenses

Since the city fathers of Portland are bound to safeguard the health of those who purchase food and drink of a victualer by rigid requirements as to sterilization of drinking glasses and by repeated inspection of licensee's quarters, an ordinance requiring victualers without beer to procure a license costing $10 per annum, and victualers with beer to obtain a license costing $35 per annum, was not discriminatory when applied to an operator of a restaurant wherein food and beer were dispensed who held a state liquor license. *Donahue* v. *City of Portland*, 15 A. (2d) 287 (Maine 1940).

Licenses—Judicial Review of Motive

The motives of the Board of Aldermen in granting a license for conducting the business of slaughtering and rendering are not subject to judicial inquiry. *Bushway-Whiting Ice Cream Co.*, v. *Mayor and Aldermen of Somerville*, 31 N. E. (2d) 533 (Mass., Jan. 28, 1941).

Officers—State Minimum Wage Laws

Policemen's and firemen's minimum wage laws of Illinois are not unconstitutional as violating provisions of the state constitution that the State Legislature shall not impose taxes upon municipal corporations, or inhabitants thereof, for corporate purposes. *Morgan* v. *City of Rockford*, 31 N. E. (2d) 596 (Ill., Feb. 12, re-hearing denied—1941).

Parking Meters—Validity

Sioux City, Iowa, parking-meter installation scheme invalidated, not because the use of the meters themselves would be unauthorized, but because the financing scheme adopted for their payment was improper. The Court held that provided for payment for the meters out of revenues only and pledging the revenue from the meters for the purpose. The Court held that pledge of any city revenue regardless of source was invalid unless expressly authorized by statute. *Brodkey* v. *Sioux City*, 296 N. W. 352 (Iowa, Feb. 18, 1941).

Spokane, Wash., parking-meter installation upheld as regulatory measure in absence of evidence proving regulation merely a sham for revenue. Also held not in conflict with Motor Vehicle Act and not violation of abutters' rights or of the right of the public to use the streets. *Kimmel* v. *City of Spokane*, 109 P. (2d) 1069 (Wash., Feb. 5, 1941).

Streets—Abutters' Rights—Blockade

Unless a street blockade can be established to be unnecessary, negligently constructed or maintained an unreasonable and unnecessary length of time, any loss of profit to an abutter as a result thereof is *damnum absque injuria*. *Thompson* v. *City of Mobile*, 199 So. 862 (Ala. Jan. 23, 1941).

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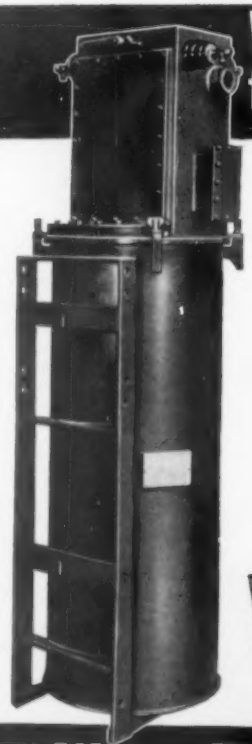

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Sewerage Service Charges

Supplementary Data on Sewer Rentals.—American Public Works Association, 1313 E. 60th St., Chicago, Ill. 1941. 14 *pp.* 15*c.*

In 1939, "Sewer Rentals" was issued, giving data for more than one hundred cities which charge rents to the users of the sewer system, based on the extent of that use. (See listing of this publication in the May, 1939, issue of THE AMERICAN CITY.) This bulletin presents information on the practices and experiences of 12 cities which have since adopted this method of financing sewerage activities, covering rate structure, billing practices, collection practices, and disposition of revenues. Revisions to the original text of "Sewer Rentals" are based on data presented here.

Traffic Problem Solutions

Getting Results Through Traffic Engineering.—National Conservation Bureau, 60 John St., New York. 1941. 28*pp.* 25*c.*

This is an enlarged edition of a 1940 publication, containing 24 examples (9 additions to the 15 original examples) of the application of traffic engineering techniques to dangerous and congested traffic situations. In each case, the problem is described and diagramed; accident facts are summarized; and field studies, the solution, and the check-back on conditions after the solution has been applied, are reported.

Airport Expansion Study

Considerations Relating to the Proposed Expansion of the Concord Municipal Airport.—A Report Submitted to the Joint Committee of the Board of Airport Commissioners and WPA Committee, by Gustaf H. Lehtinen, Director, City Planning Board, Concord, N. H. 1940. 30 *pp.*

If Concord should care to participate in the national airport expansion program, the WPA offered to share expenses with the city. To help the city in deciding whether to accept this offer, this report was made. It describes facilities, operation, and financing of the present airport, and the extent and cost of the proposed expansion. The need for the expansion and its merits for the city are then analyzed.

Waterfront Planning

The Lake Front in Milwaukee County.—Citizens' Bureau of Milwaukee, 125 E. Wells St., Milwaukee, Wis. 1940. *V* + 40 *pp., mimeographed.*

Under the sponsorship of the Citizens Lake Front Committee of the Citizens' Bureau, a group of officials and citizens representing five governmental bodies and five civic organizations made this study of Milwaukee's waterfront. It describes the present use of the harbor and of the park and boulevard system on the land bordering on the lake, and makes recommendations for a comprehensive coordinated—or master—plan for the entire waterfront.

1940 City Elections

City Proposals Voted Upon: 1940 (*State and Local Government Special Study No.* 12).—*Bureau of the Census, Department of Commerce, Washington, D. C.* 1941. 30 *pp.*

In cities of 25,000 population or over, more than 7 million voters marked the ballot to decide 476 local proposals, and in an unusually receptive mood approved 320 of them. An analysis is made in this report of the voting and the measures voted on—description of measures, geographic distribution, number of proposals in relation to population of cities, months in which elections were held, percentage of voting population that voted for measures, and cities of 25,000 that did not vote on proposals.

Urban Planning and Land Policies

Urban Planning and Land Policies—Volume II of the Supplementary Report of the Urbanism Committee to the National Resources Committee. Released by the National Resources Planning Board, 1941. *Apply to Supt. of Documents, Washington, D. C. vi* + 336 *pp.* $1.00.

This is the second and last supplementary volume to "Our Cities—Their Role in the National Economy," published in 1937; the first being "Urban Government," published in 1939. Both of these supplementary volumes consist of data and illustrations which were collected for the preparation of the original report but could not be included in it.

Like the two preceding reports, this publication is panoramic and comprehensive in point of view and scope. It contains three parts. The first, "Planned Communities," by Arthur C. Comey and Max S. Wehrly, describes and appraises 144 planned units in this country, which have been developed by industry, government, real estate, and philanthropic organizations. Recommendations are made in the light of the appraisals arrived at. A shorter part of the report, by Louis Wirth and Edward Shils, on "Urban Living Conditions," investigates the economic aspects of housing—particularly home ownership, rent, and income; the physical characteristics of urban dwellings in the country; and the relation of housing to health, crime and other social conduct. The last part of the volume, "Urban Land Policies," by Harold S. Buttenheim, Editor of THE AMERICAN CITY, and several collaborators, contains a detailed examination of the complicated land problems and policies of cities in this country. The six sections cover: Land Policies and Land Uses Which Affect Rational Urban Development; Review of Prevailing Urban and Suburban Land Policies; City Planning, Zoning, and Subdivision Control as Factors in Urban Land Policies; Neighborhood Planning and the Rehabilitation of Blighted Areas and Slums; Taxation as an Aid or Handicap to Rational Urban Land Policies; and Desirability, Pro and Con, of Increased Public Ownership of Urban Land. Extensive recommendations for future action and study are outlined. (See p. 85.)

Public Utilities

Public Utility Economics.—By C. Woody Thompson and Wendell R. Smith. McGraw-Hill Book Co., New York. 1941. x+727 *pp.* $4.50 *from* THE AMERICAN CITY.

This solid volume covers much more than the economics of public utilities. Several excellent chapters present the historical development of public utilities in this country, and more than half the volume discusses the agencies, procedures, and policies of public utility regulation. Another section deals with the growth of public ownership at local, state, and national levels. There are useful bibliographical notes to the most recent literature and public reports. Designed as a textbook, it is a handy volume for ready reference.

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Budgets

Budget Procedures.—Feb., 1941, *issue of "Municipal Finance," official organ of the Municipal Finance Officers' Association of the United States and Canada,* 1313 E. 60th St., *Chicago, Ill.* 31 *pp.*

Devoted entirely to budgets, this issue of *Municipal Finance* contains the following articles: Whither the Budget?; A Day in the Federal Budget Bureau; Budget Control in Cleveland Schools; The New York State Budget; Budget Procedure in Pasadena; Quebec Controls Monthly Budget; Setting Up Budget Controls; Accounting Questions and Problems; and a Select Bibliography on Governmental Budgeting.

Traffic Accident Cause

Highway Safety and Automobile Styling—By Arthur W. Stevens, Member, Society Automotive Engineers. The Christopher Publishing House, 1140 Columbus Ave., Boston, Mass. 1941. 155 *pp.* $1.75 *from* THE AMERICAN CITY.

The author of this book believes that one of the major causes of traffic accidents, heretofore largely overlooked, is the present design of cars, which cuts down the driver's visibility greatly. He analyzes traffic accidents, and points out why he believes this to be so. Recommendations are made for a new automobile design which would move the engine from the front to the rear of the car.

Traffic Accidents

Here Today —. —The Travelers Insurance Company, Hartford, Conn. 1941. 36 *pp. Free.*

"The year 1940 was a year of retrogression, of disappointment and disillusionment in virtually every respect pertaining to street and highway safety." This is the pessimistic tone of this vivid report of the year's accidents in traffic, the eleventh of the series. There were more accidents than in 1938 and 1939: more than 35,000 persons killed; 1,320,000 injured; an average of 98 persons killed each day. The booklet analyzes conditions and causes of accidents, and points out what must be done to prevent them.

Traffic Convention

1940 *Proceedings, Institute of Traffic Engineers.—The Institute, 60 John St., New York.* 161 *pp.*

This is the first time the proceedings of the annual meeting of the Institute have been published. Containing articles by leading traffic experts, "representing the condensation of years of experience of many men," they cover the whole field of traffic—transportation, highway design and planning, safety, signs and signals, parking, the pedestrian, lighting, etc.

Pittsburgh Traffic Study

Motor Vehicle Traffic Accident Analysis, City of Pittsburgh.—Bureau of Traffic Planning, Department of Public Safety, Pittsburgh, Pa. 1940. 18 *pp.*

Why were there 5,341 traffic accidents in the city of Pittsburgh during 1940? And why were there so many more accidents in 1940 than 1939? These alarming questions are tackled in this thorough analysis of the causes and conditions of traffic accidents in that city. It investigates the relation of accidents to hours of the day, day of the week, month of the year, age of persons killed, type of accident, and various facts about persons involved in accidents.

Street Plan

A Comprehensive Plan of Motorways for Detroit.—By G. Donald Kennedy, State Highway Commissioner, Michigan State Highway Department, Lansing, Mich. 1941. 15 *pp.*, 11" x 14".

This is a dramatic and striking popular presentation of a large city's traffic and street problem, considered in relation to other problems involved in it—decaying central areas, declining land values, decentralization, transportation, land uses, provision for open spaces—problems common to most big cities in the country. With the aid of maps and clever cartoons, it lays down the broad outlines of a comprehensive plan of motorways for the Detroit area, in substantial agreement with the Master Plan made for the region in 1925, but taking account of changes which have occurred since then. Purposes, types, and routes of the proposed motorways are clearly explained.

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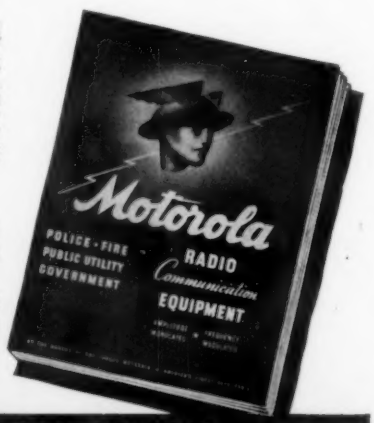

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Hawaii Planning Reports

Two publications of the Territorial Planning Board, Honolulu, Hawaii.

Report on the Executive-Legislative Quarters in Relation to Honolulu Civic Center. 1941. 31 *pp.*

In this consideration of the needs of Honolulu's civic center, to serve the requirements of Honolulu both as a city and as the Territory's capital, a study has been made of capitol building groups in various states in this country. Recommendations are made for needed land and improvements, and for the layout and plans of the center and the individual buildings within it.

Conservation and Development of National Resources: A Program for Hawaii. 1941. 25 *pp.*

Besides outlining the initial steps in a program for the development of the Territory, this publication contains a recommended planning and zoning enabling act for the counties of the Territory, and a classified directory for use in human resources committee planning, listing pertinent organizations and associations here and in Hawaii.

Employment and the Community

Community Employment Problems under Defense.—Prepared in consultation with members of the national panel of consultants of the Committee of Correspondence of the Council for Democracy, 285 Madison Ave., New York. 1941. 34 *pp.* 10c.

"Already, in the name of defense," says this stimulating and timely report, "committees are being formed to hunt submarines, to shoot parachutists, and to evacuate cats in case of bombing." It is to avoid some of this ill-aimed energy and enthusiasm, and to direct it into useful and productive channels that this publication has been written for the citizens of any town, to determine just what the problem is when there are still many unemployed while defense jobs remain unfilled, and what can be done about it. It discusses the method of farming-out industry, and its application in various communities; the effect of new defense on the community now and after the emergency; the problem of training labor to fit available jobs; and other factors, such as housing, "labor troubles," labor and the draft, and the "alienation of aliens."

Post-War Planning

A Plan for Britain.—National Economic and Social Planning Association, 1721 Eye St., N. W., Washington, D. C. 1941. 56 *pp.* 25c.

The British weekly, *Picture Post,* devoted its Jan. 18 issue to "A Plan for Britain." (Copies may be obtained from Picture Post, Hulton Press, Ltd., 43 Shoe Lane, London, E.C.4, England.) The National Economic and Social Planning Association, considering it one of the most explicit statements of British war aims that have yet appeared, has reprinted the whole issue (minus the many illustrations), because of our concern for post-war Britain, but particularly as an example of the type of constructive thought that should be undertaken in this country. Written by experts in their respective fields, it contains the following articles: Work for All—The First Necessity in the New Britain; Social Security; The New Britain Must Be Planned; Plan the Home; The Land for All; A Plan for Education; Health for All; A Real Medical Service; When Work Is Over.

Popular Housing Digest

Housing for Citizens.—American Association for Adult Education, 60 E. 42d St., New York. 1941. 12 *pp.* 10c.

The principal facts of the country's complicated housing problem have been successfully condensed into this small pamphlet—one of the briefest of the numerous popular discussions of the housing question that have been published in the last few years. What is the problem and its possible consequences? Its extent? Its causes? What has been done about it? What about public and private housing? What is the relation of housing to democracy? These are the points which it takes up, with suggested questions for use in discussion groups, and a list of additional study material.

New York Housing and Planning

Housing and Regional Planning.—By Herman Kobbé. E. P. Dutton and Co., Inc., New York. 1941. 253 *pp.* $3.00 *from* THE AMERICAN CITY.

Under the comprehensive title, "Housing and Regional Planning," this book revolves its discussion around the New York area, ranging in scope from an outline of broad planning principles to a detailed analysis of the design of staircases—with most of its space devoted to a discussion of architecture and landscaping for housing projects. Making practically no reference throughout to anything that has already been done or written on New York planning and housing, and mentioning the "absence of anything like a comprehensive or adequate Regional Plan" for New York and environs (the eight volumes of the "Regional Plan of New York" notwithstanding), the book recommends legislation for the creation of a "Metropolitan Regional Land Authority," and then outlines the program the author feels should be followed for rebuilding the region. "The Authority proceeds in the belief," states the last paragraph in the book, that this task can be "substantially accomplished in twenty years, after which it is anticipated that every family living in the Region will be not only adequately housed, but also provided with all facilities for community life." Following a 6-page presentation of the main outlines of a plan for the region, there is a discussion of transportation, slum clearance and urban housing, village planning, house and garden plans, community centers, seaside and mountain housing, and the financing of the plan; with 45 pages devoted to gardens, parks and land conservation. Format and illustrations of the book are attractive.

Relief

Government and the Needy—A Study of Public Assistance in New Jersey.—By Paul Tutt Stafford. Princeton University Press, Princeton, N. J. 1941. *xiv* + 328 *pp.* $3.00 *from* THE AMERICAN CITY.

The author of this book points out the pressing need of reform in our confused and wasteful policy and administration of public relief. In this volume he presents a case study of the problem as it exists in New Jersey. The historical development of public poor relief institutions in the state is outlined, and the present set-up is described in detail. A concluding chapter sets forth a recommended Federal-state-local program for the future.

Regional Recreation Study

Development of Public Recreation in Metropolitan Chicago.—By Elizabeth Halsey, Ph. D., Professor and Head, Department of Physical Education for Women, State University of Iowa. Chicago Recreation Commission, 160 N. LaSalle St., Chicago. 1941. *xii* + 334 *pp.* $1.00.

This study fulfills two general, present-day needs: that for more information on the increasingly important subject of recreation; and that for more knowledge of governmental functions throughout a whole metropolitan region. Written in an interesting style, the book contains two main parts, dealing with the history, administration, and facilities of recreation, in the city of Chicago, and in the region surrounding Chicago, respectively. A third part contains three concluding chapters: Regional Problems; Possible Solutions; Summary of Findings.

New York Museums

Museums—Report to the Mayor of the City of New York by the Commissioner of Parks.—Robert Moses, Commissioner, Department of Parks, 64th St. and Fifth Ave., New York. 1941. 15 *pp.*

This is another of the dramatic reports put out by New York's dramatic Commissioner of Parks, and, like other of his reports, it has caused considerable comment in New York's newspapers. Mr. Moses believes the museums need to be modernized, enlivened, and brought closer to the people, whose interests they are intended to serve. He makes recommendations for bringing them up to date, as to personnel, management, exhibits, financing.

Land Values and Housing Density

Land Values in Relation to Planning and Housing in the United States.—By Sir Raymond Unwin. Reprinted from the Feb., 1941, issue of The Journal of Land and Public Utility Economics. Apply to THE AMERICAN CITY, *470 Fourth Ave., New York.* 9 *pp.* 10c.

This is the late Sir Raymond Unwin's last work. In it, he re-states the case he had so frequently presented for low building densities in cities. He gives figures for New York and Chicago to show that present high land prices, which are forcing high densities, are based on fictitious land values which—with the present decreasing population growth—will never be realized. He demonstrates further that, for the whole body of landowners in a community, and for the city, lowered densities mean increased land values; that they mean reduced costs of development, lowered costs for recreation, benefits to the tenant, and a speedier redemption of blight.

Pension System

Police Relief and Pension Funds in the State of Washington.—Bureau of Governmental Research, University of Washington, Seattle, Wash. 1941. 16 *pp.*

Pension systems are of growing interest at a time when the percentage of older people in the population is increasing, and when the financial obligations of cities are becoming greater. This is a critical analysis of police relief and pension funds as they operate in first-class cities in Washington. It analyzes the original, 1909, Police Relief Pension Fund and its various amendments, its sources of revenue, and the provisions that it makes for members of the police department. Deficiencies are pointed out.

Other Reports Received

BEVERLY HILLS, CALIF.—Annual Report, Fire Chief, 1940. 31 pp.

CLEVELAND, OHIO—"Behind the Headlines"—a 14-month chronology of the activities of The Cleveland Chamber of Commerce. 16 pp.

DETROIT, MICH.—Municipal Manual, 1940, compiled by Fred W. Castator, City Clerk. 224 viii pp., 3½" x 6".

EAST PROVIDENCE, R. I.—East Providence, R. I.—A Town of Industrial Prominence and of Beautiful Homes—Some Facts and Data. East Providence Business Men's Association. 41 pp.

FORT MORGAN, COLO.—Annual Report, 1940. 53 pp.

FREDERICKSBURG, VA.—Annual Report, City Manager, 1940. 70 pp.

GRAND JUNCTION, COLO.—Highlights of Your City Government, 1940. 15 pp.

JACKSONVILLE, FLA.—"Housing Comes of Age."—First Annual Report of the Housing Authority, 31 pp.

LEXINGTON, KY.—Budget, 1941; Audit Report, 1940. 98 pp.

LYNCHBURG, VA.—Annual Report, 1940. 47 pp.

NEW JERSEY—Official Municipal Plan of Defense. Aug. 10, 1940; reprinted Feb. 24, 1941. 9 pp.

—Community Defense Service Councils. New Jersey Defense Council, Trenton, N. J. 7 pp.

NEW YORK.—Seventh Annual Report, New York City Housing Authority, 1940. 15 pp.

NORTHUMBERLAND, N. H.—Annual Report, Municipal Officers, year ending Jan. 31, 1941. 58 pp.

PENNSYLVANIA.—Annual Report, 1940, Pennsylvania Economy League, 600 N. Second St., Harrisburg. 15 pp.

ROANOKE, VA.—Financial Report, City Auditor, 1940. 62 pp.

ROCK SPRINGS, WYO.—Annual Report, 1940, Treasurer. 59 pp.

Uniform Crime Reports for the United States and Its Possessions, 1940. Federal Bureau of Investigation, U. S. Department of Justice, Washington, D. C.

WRITE FOR
BULLETIN No. 7A

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Conventions - - When and Where

Meeting is annual convention unless otherwise designated

April 14-16.—Fayetteville, Ark.
ARKANSAS WATER AND SEWAGE WORKS CONFERENCE. (Univ. of Arkansas.) Sec., Harrison Hale, Univ. of Arkansas, Fayetteville, Ark.

April 16-19.—Cincinnati, Ohio.
NATIONAL ASSOCIATION OF HOUSING OFFICIALS. (Netherlands Plaza Hotel.) Sec., Coleman Woodbury, 1313 E. 60th St., Chicago, Ill.

***April 20-22.—San Jose, Calif.**
CALIFORNIA SEWAGE WORKS ASSOCIATION. Sec., Fred D. Bowlus, 202 Law Bldg., Los Angeles, Calif.

***April 21-22.—Birmingham, Ala.**
SOUTHERN REGIONAL CONFERENCE OF THE AMERICAN PUBLIC WORKS ASSOCIATION. (Tutwiler Hotel.) Acting Exec. Dir., Norman Hebden, 1313 E. 60th St., Chicago, Ill.

April 23-25.—Excelsior Springs, Mo.
MISSOURI ASSOCIATION OF PUBLIC UTILITIES. (Elms Hotel.) Asst. Sec., Jesse Blythe, 101 W. High St., Jefferson City, Mo.

April 24-25.—Indianapolis, Ind.
AMERICAN WATER WORKS ASSOCIATION—Indiana Section. (Hotel Antlers.) Sec., H. G. Horstman, 603 Traction Terminal Bldg., Indianapolis, Ind.

April 28-30.—Quincy, Ill.
AMERICAN WATER WORKS ASSOCIATION—Illinois Section. (Lincoln Douglas Hotel.) Sec., H. E. Hudson, Jr., 6843 Oglesby Ave., Chicago, Ill.

April 28-May 1.—Washington, D. C.
CHAMBER OF COMMERCE OF THE UNITED STATES. Sec., Ralph Bradford, 1615 H St., N. W., Washington, D. C.

April 30-May 2.—Albany, Ga.
ASSOCIATION OF COUNTY COMMISSIONERS OF GEORGIA. Exec. Sec., Betty Peeler, 134 Peachtree St., N. W., Atlanta, Ga.

May 3-5.—Louisville, Ky.
NATIONAL ASSOCIATION OF COUNTY OFFICIALS. Sec.-Treas., George F. Breitbach, Court-House, Milwaukee, Wis.

May 8-10.—Seattle, Wash.
AMERICAN WATER WORKS ASSOCIATION—Pacific Northwest Section. (Olympic Hotel.) Sec., Fred Merryfield, Oregon State College, Corvallis, Ore.

May 8-9.—Washington, D. C.
MARYLAND-DELAWARE WATER AND SEWERAGE ASSOCIATION. (Hotel Raleigh.) Sec.-Treas., Chesley F. Garland, 2411 N. Charles St., Baltimore, Md.

May 11-14.—Philadelphia, Pa.
NATIONAL CONFERENCE ON PLANNING. Joint annual conference of American Society of Planning Officials, American Institute of Planners, the American Planning and Civic Association, and the National Economic and Social Planning Association. Conference Dir., Miss Harlean James, 901 Union Trust Bldg., Washington, D. C.

May 12-14.—Charleston, S. C.
AMERICAN WATER WORKS ASSOCIATION—Southeastern Section. (Ft. Sumter Hotel.) Address: Sec., B. P. Rice, Reconstruction Finance Corp., Healey Bldg., Atlanta, Ga.

May 12-13.—Carthage, Mo.
MISSOURI ASSOCIATION OF MUNICIPAL UTILITIES. (Drake Hotel.) Sec.-Treas., W. J. McCarroll, Fulton, Mo.

May 12, Week of.—Toronto, Ont.
NATIONAL FIRE PROTECTION ASSOCIATION. (Royal York Hotel.) M'ng Dir., Percy Bugbee, 60 Batterymarch St., Boston, Mass.

***May 14-15.—Escanaba, Mich.**
UPPER PENINSULA WATER WORKS ASSOCIATION, (Sherman Hotel.) Address: Chairman, S. J. Shank, Supt. of Water Works, Escanaba, Mich.

May 15-16.—Cincinnati, Ohio.
AMERICAN WATER WORKS ASSOCIATION—Ohio Section. (Gibson Hotel.) Sec., T. R. Lathrop, State Dept. of Health, Columbus, Ohio.

May 17-19.—Yosemite Valley, Calif.
AMERICAN INSTITUTE OF ARCHITECTS. Exec. Sec., E. C. Kemper, 1741 New York Ave., Washington, D. C.

May 19-22.—Kalamazoo, Mich.
BUILDING OFFICIALS' CONFERENCE OF AMERICA. Address: Sec.-Treas., Arthur N. Rutherford, Building Inspector, West Hartford, Conn.

May 19-22.—Louisville, Ky.
MUNICIPAL FINANCE OFFICERS ASSOCIATION OF THE UNITED STATES AND CANADA. (Brown Hotel.) Exec. Sec., Carl H. Chatters, 1313 E. 60th St., Chicago, Ill.

May 22-25.—Walla Walla, Wash.
ASSOCIATION OF WASHINGTON CITIES. (Marcus Whitman Hotel.) Exec. Sec., Chester Biesen, Univ. of Washington, Seattle, Wash.

May 23-24.—Missoula, Mont.
AMERICAN WATER WORKS ASSOCIATION—Montana Section. (Hotel Florence.) Sec., Herbert B. Foote, State Board of Health, Helena, Mont.

May 30-June 1.—Atlantic City, N. J.
COMMUNITY CHESTS AND COUNCILS, INC. Exec. Vice-Pres., Allen T. Burns, 155 E. 44th St., New York.

June 3-6.—Atlanta, Ga.
SMOKE PREVENTION ASSOCIATION. (Ansley Hotel.) Sec., Frank A. Chambers, City Hall Square Bldg., Chicago, Ill.

June 9-11.—Albany, N. Y.
CONFERENCE OF MAYORS AND OTHER MUNICIPAL OFFICIALS OF THE STATE OF NEW YORK. Exec. Sec., William P. Capes, City Hall, Albany, N. Y.

June 12-14.—Lancaster, Pa.
EASTERN ASSOCIATION OF FIRE CHIEFS. (Hotel Brunswick.) Sec., Charles E. Clark, Box 217, Wayne, Pa.

June 19-21.—Niagara Falls, N. Y.
NEW YORK STATE SEWAGE WORKS ASSOCIATION. Spring meeting. Sec.-Treas., A. S. Bedell, State Dept. of Health, Albany, N. Y.

June 22-26.—Toronto, Ont.
AMERICAN WATER WORKS ASSOCIATION. (Royal York Hotel.) Sec.-Treas., Harry E. Jordan, 22 E. 40th St., New York.

June 29-July 3.—Boston, Mass.
NATIONAL EDUCATION ASSOCIATION OF THE UNITED STATES. Exec. Sec., Willard E. Givens, 1201 16th St., N. W., Washington, D. C.

July 22-25.—Philadelphia, Pa.
PENNSYLVANIA CHIEFS OF POLICE ASSOCIATION. Sec., F. B. Titus, Lansdowne, Pa.

August 17-23.—Evanston, Ill.
NATIONAL INSTITUTE FOR COMMERCIAL AND TRADE ORGANIZATION EXECUTIVES. (Northwestern Univ.) Sec.-Treas., Clarence R. Miles, 832 First Nat'l Bank Bldg., Chicago, Ill.

August 18-21.—Buffalo, N. Y.
INTERNATIONAL ASSOCIATION OF CHIEFS OF POLICE. Exec. Sec., Edward J. Kelly, 918 F St., N. W., Washington, D. C.

August 26-29.—Washington, D. C.
NATIONAL SHADE TREE CONFERENCE. (Mayflower Hotel.) Sec.-Treas., L. C. Chadwick, Ohio State Univ., Columbus, Ohio.

September 1-3.—State College, Pa.
PENNSYLVANIA WATER WORKS OPERATORS' ASSOCIATION. Sec.-Treas., I. M. Glace, 22 S. 22d St., Harrisburg, Pa.

September 3-5.—State College, Pa.
PENNSYLVANIA SEWAGE WORKS ASSOCIATION. (Pennsylvania State College.) Sec.-Treas., Bernard S. Bush, Kirby Health Center, Wilkes-Barre, Pa.

September 13-21.—Santiago de Chile, S. A.
PAN AMERICAN CONGRESS OF MUNICIPALITIES. Address: Exec. Dir., Earl D. Mallery, American Municipal Association, 1313 E. 60th St., Chicago, Ill.

***September 18-19.—Santa Fe, N. Mex.**
AMERICAN WATER WORKS ASSOCIATION—Rocky Mountain Section. (La Fonda Hotel.) Sec., B. V. Howe, State Office Bldg., Denver, Colo.

September 25-26.—Boston, Mass.
NEW ENGLAND WATER WORKS ASSOCIATION. (Hotel Statler.) Sec., Frank J. Gifford, 615 Statler Bldg., Boston, Mass.

September 24-26.—Grand Rapids, Mich.
AMERICAN WATER WORKS ASSOCIATION—Michigan Section. Sec., M. N. Gerardy, Water Board Bldg., Detroit, Mich.

October 6-9.—New Orleans, La.
AMERICAN INSTITUTE OF PARK EXECUTIVES AND AFFILIATED ORGANIZATIONS. (Roosevelt Hotel.) Exec. Sec., Will O. Doolittle, Box 422, Tulsa, Okla.

October 6-10.—Chicago, Ill.
NATIONAL SAFETY COUNCIL. M'ng Dir., W. H. Cameron, 20 N. Wacker Drive, Chicago, Illinois.

October 12-14.—Virginia Beach, Va.
LEAGUE OF VIRGINIA MUNICIPALITIES. (Cavalier Hotel.) Exec. Sec., Morton L. Wallerstein, 902 Travelers Bldg., Richmond, Va.

October 12-16.—St. Paul, Minn.
NATIONAL TAX ASSOCIATION. (Lowry Hotel.) Sec., Raymond E. Manning, Library of Congress, Washington, D. C.

October 13-16.—Fort Worth, Texas.
AMERICAN WATER WORKS ASSOCIATION—Southwest Section. Sec., Lewis A. Quigley, 3320 W. Berry St., Fort Worth, Texas.

October 14-17.—Atlantic City, N. J.
AMERICAN PUBLIC HEALTH ASSOCIATION. (Convention Hall and Auditorium.) Exec. Sec., Dr. Reginald M. Atwater, 50 W. 50th St., New York.

October 19-22.—Jacksonville, Fla.
NATIONAL ASSOCIATION OF ASSESSING OFFICERS. Exec. Dir., Albert W. Noonan, 1313 E. 60th St., Chicago, Ill.

***October 20-22.—Cedar Rapids, Iowa.**
AMERICAN WATER WORKS ASSOCIATION—Missouri Valley Section. Sec., Earl L. Waterman, Univ. of Iowa, Iowa City, Iowa.

October 22-25.—Fresno, Calif.
AMERICAN WATER WORKS ASSOCIATION—California Section. (Fresno Hotel.) Sec., Gerald E. Arnold, San Francisco Water Dept., Millbrae, Calif.

October 26-29.—New Orleans, La.
AMERICAN PUBLIC WORKS ASSOCIATION. Acting Exec. Dir., Norman Hebden, 1313 E. 60th St., Chicago, Ill.

***October 27-29.—Nashville, Tenn.**
AMERICAN WATER WORKS ASSOCIATION—Kentucky-Tennessee Section. Sec.-Treas., Howard D. Schmidt, 420 6th Ave., N., Nashville, Tenn.

October 27-28.—Pittsburgh, Pa.
ENGINEERING SOCIETY OF WESTERN PENNSYLVANIA. (William Penn Hotel.) Gen. Chairman, H. M. Olson, 171 Longue Vue Drive, Mt. Lebanon, Pittsburgh, Pa.

***November 3-5.—High Point, N. C.**
Joint meeting. (Sheraton Hotel.) AMERICAN WATER WORKS ASSOCIATION—North Carolina Section and North Carolina Sewage Works Association. Sec., R. S. Phillips, Box 1170, Durham, N. C.

November 6-7.—Baltimore, Md.
AMERICAN WATER WORKS ASSOCIATION—Four States Section. Address: Sec., Lloyd Nelson, U. S. Pipe & Foundry Co., Broad and Chestnut Sts., Philadelphia, Pa.

***November 25-27.—Place later.**
INTERNATIONAL CITY MANAGERS' ASSOCIATION. Exec. Dir., Clarence E. Ridley, 1313 E. 60th St., Chicago, Ill.

*First appearance of notice on this page.

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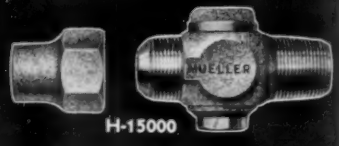

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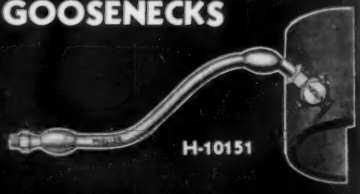

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H-10150

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News and Illustrations

Items of Interest to City, Town and County Officials, and Others Concerned with the Economical Construction and Efficient Operation of Public Improvement Undertakings

J. E. Pennybacker, Late Managing Director, The Asphalt Institute

Pennybacker Dies, Asphalt Institute Head

J. E. Pennybacker, Managing Director of The Asphalt Institute, 801 Second Avenue, New York, and managing head of its predecessor, The Asphalt Association, since 1919, died on February 25, in Florida, where he had gone to regain his health. Born in Franklin, W. Va., in January, 1878, he attended the University of West Virginia and Georgetown University, receiving an LL.B degree from the latter.

He became Chief Economist of the U. S. Bureau of Public Roads in 1906; from 1910 to 1914 he was Secretary of the American Highway Association; in 1912 he was Statistician of the Senate Committee on Post Offices and Post Roads, and in 1913 adviser to the Ontario Highway Commission.

From 1914 to 1917, Mr. Pennybacker was Chief of Management of the U. S. Bureau of Public Roads; during the World War, Secretary of the U. S. Highways Council; Chairman, Road Board, American Automobile Association, 1919; and a founder of the American Association of State Highway Officials.

Pittsburgh Equitable Acquires National Meter

The Pittsburgh Equitable Meter Co., of Pittsburgh, Pa., has purchased the assets of the National Meter Co., of Brooklyn, N. Y., and will operate the National plant as a division of the Pittsburgh Equitable Meter Co. This brings under one management the facilities of two of the country's oldest meter manufacturers as well as placing the manufacture of a complete line of all types and sizes of meters under one management. A total of nine different types of meters are made by these two companies, including flat and conical nutating disc; oscillating, reciprocating and rotary piston; screw-propulsion; current and compound types.

No change is contemplated in the personnel. The same salesmen will continue to call on customers in their respective territories. Additional district offices and warehouse facilities with adequate inventories are expected to provide greater service and convenience for the trade. Manufacturing plants are located in Pittsburgh, Pa., Hopewell, N. J., Columbus, Ohio, Oakland, Calif., and Brooklyn, N. Y. These plants have been thoroughly modernized within the last few years and are equipped with the latest types of machine tools for the manufacture of precision meters.

Both President W. F. Rockwell of the Pittsburgh Company, and President N. J. Kenny of National, have emphasized the completeness of the line of meters which this purchase makes possible. Of interest is the fact that there is no overlapping between Pittsburgh products and those made by National. Structural differences and design features in meters identified by trade names, and popularized during the many years of separate operation, will be continued as the Pittsburgh-National line. Prompt deliveries of both new meters and parts for any of the existing types can be obtained from Pittsburgh Equitable or its National Division.

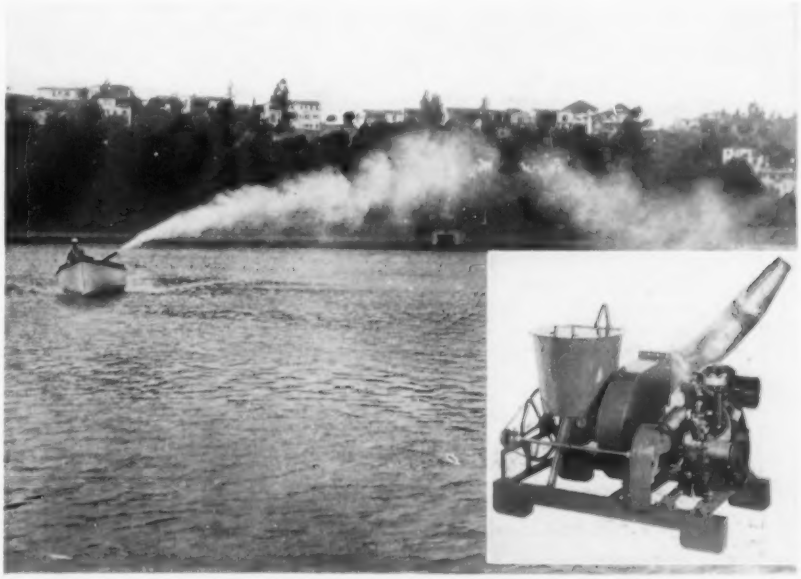
Blowing Dry Chemical for Algae Control

The Los Angeles Department of Water and Power has made exhaustive tests on the distribution of dry copper sulphate for the treatment of algae in reservoirs and lakes. Considerable saving has been effected through use of special distributors made by the Utility Fan Corporation, Los Angeles, Calif. The usual method of treatment by dragging sacks of the copper sulphate crystals alongside boats made it difficult to determine the amount used and to insure uniformity of distribution. The cost was also high.

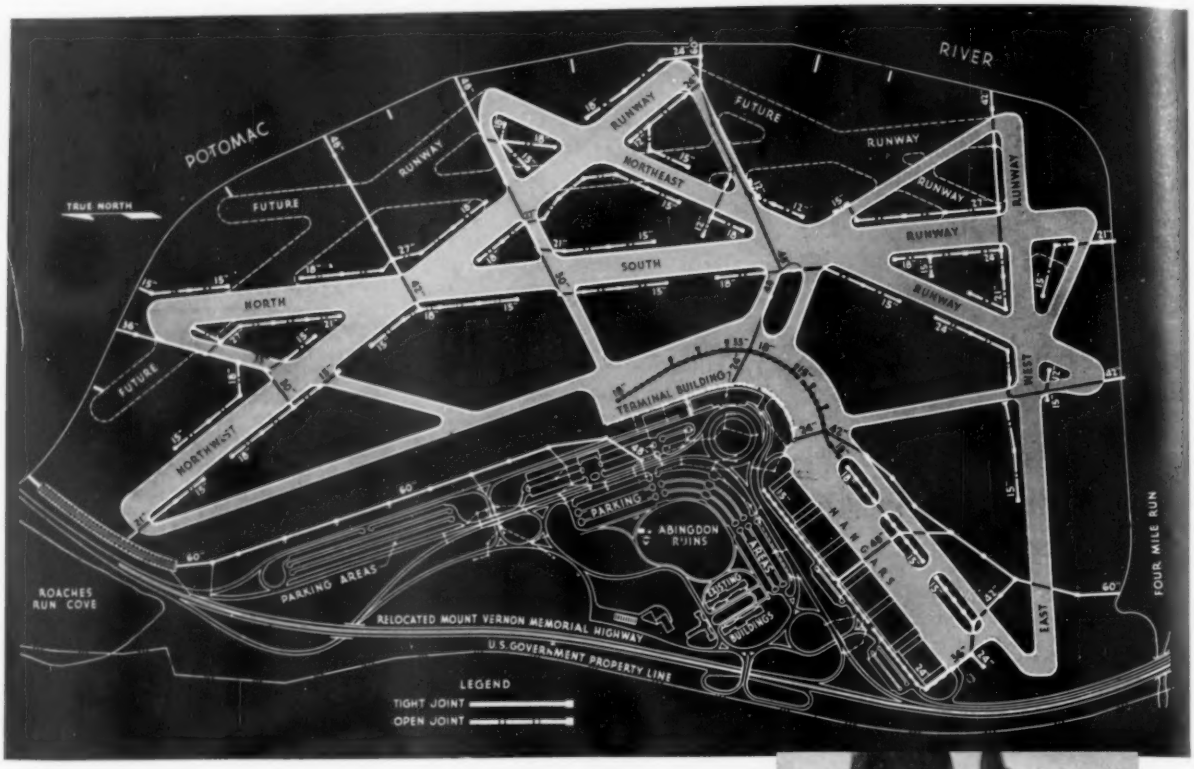
The Utility sulphur spreader is operated from any type of motor or rowboat. One man keeps the hopper loaded and regulates the rate of speed and the angle of the spout for even distribution. The hopper is adjustable to wind velocity and can be used in winds up to 30 miles an hour. The rate of flow is readily varied, according to reports, according to wind conditions, the speed of the boat, and the amount of copper sulphate to be used.

New Catalog Available on Water-Level Control

Liquid level controls free from floats or other moving parts in the liquid were developed by Bender Warrick Corporation, 123 Pierce Street, Birmingham, Mich., in 1933. This system of floatless liquid level control consists of the patented B/W induction relay, and electrodes which are suspended from electrode holders into the liquid to be controlled. The principle and operation of this relay are described in detail on page 3 of the newest Bender-Warrick Catalog, No. 241, which will be sent to readers of THE AMERICAN CITY free on request. This catalog is very well illustrated, and contains lists of operations which are readily controlled by this device, prices and specifications and wiring diagrams.



Detail and Method of Operating a Utility Blower for the Distribution of Dry Copper Sulphate in Algae Control



Drainage is a vital airport problem!

PREVENT FAILURES! USE

CONCRETE PIPE

Drainage is the primary consideration in airport design, construction and maintenance. Guard against trouble and excessive maintenance costs by designing a complete drainage system *with concrete pipe* as an integral part of the airport development.

Concrete pipe offers maximum structural safety, maximum hydraulic capacity and proved durability. Joints in concrete pipe lines are made and remain tight, or can be left open to facilitate infiltration.

These advantages are discussed in *"Concrete Pipe for Airport Drainage,"* published by the American Concrete Pipe Association. You may have a copy of this valuable bulletin, which describes in detail the drainage systems at Washington, Buffalo, New Orleans and other airports, and gives data that will help you in planning effective drainage for your airport.

Detail showing how infiltration was provided by dapping tongue end of concrete so that two arcs of 75 degrees each were provided at pipe joints.

●

(Above) Drainage system of the Washington National Airport as of November, 1940. Included are 64,056 ft. of concrete pipe ranging in diameter from 10 to 60 in.

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Please send me bulletin, *"Concrete Pipe for Airport Drainage,"* giving design data and describing important installations.

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City _____ *State* _____

During April we hope you will remember to mention THE AMERICAN CITY.

Col. W. F. Rockwell

W. F. Rockwell to Serve on National Committee

Colonel W. F. Rockwell, President of the Pittsburgh Equitable Meter Co. and Merco Nordstrom Valve Co., 400 Lexington Avenue, Homewood, Pittsburgh, Pa., has been elected to serve on the National Committee on Business Welfare. This committee has been established by the Chamber of Commerce of the United States to further the aims of the National Chamber through many broad objectives designed to solve serious problems affecting business and the general welfare.

Effect of Sump Areas on Pump Performance

The effect of sumps of restricted proportions on the performance of propeller pumps, compared with results in unrestricted sump areas is extremely interesting, according to J. M. Hait, Chief Engineer, Peerless Pump Division, Food Machinery Corporation, 301 West Avenue 26, Los Angeles, Calif. Previous to tests made by Mr. Hait it had been assumed that equalized flow conditions of a totally unconfined sump area would result in the most efficient operation of propeller pumps, but these tests conclusively reveal the error of such assumption.

Tests were made with varying distances from the pump suction to the sump floor with different side wall clearances, and with flow arrangements restricted and unrestricted to determine the setting for most economical operation. It was found that axial and mixed-flow propeller pumps are more sensitive to the distribution of velocity at the inlet to the propeller than are centrifugal pumps of lower specific speeds.

The tests showed that the practical proportions for a propeller pump sump from the standpoint of efficient operation are such that the side wall and the sump bottom clearances relative to the suction bell need not exceed one-half the suction bell diameter. It was definitely proved that if the sump is installed in a large body of water without appreciable confinement, the operating head and efficiency will be lower.

This investigation showed likewise that the best performance is obtained from a series of propeller pumps when installed at the end of a rectangular approach channel with sufficient length to the channel to insure uniformly distributed flow parallel to the channel walls without a swirling motion to the water when reaching the pump intake. The multiple pump installation thus should be such that each pump has its individual approach channel with dimensions as specified for single pumps.

These tests, upsetting as they do preconceived ideas of flow into propeller pump suctions, will no doubt result in widespread changes in propeller pump sump design.

Complete reports with engineering graphs giving the full results of these experiments are obtainable by communicating with the Peerless Pump Division, Food Machinery Corporation, 301 West Avenue 26, Los Angeles, Calif.

New Automatic Printer for Ink Tracings

A new 42-inch blueprinting machine, which operates with either cut sheets or roll stock and prints ink tracings at from 12 to 15 feet per minute, has been announced by Charles Bruning Co., Inc., 100 Reade Street, New York. This Model 55 BW Printer is 32 inches wide, 62 inches long, and 48 inches high.

An exclusive feature of this machine is its new printing and tracing return. The entire top of the machine serves as a return tray, and the return is so designed that the tracing enters the tray on top of the print in exactly the same way as it is inserted in the machine, so that no reversing of the tracing is necessary when reinserting. The light source is a 55-watt mercury vapor quartz lamp, which has a guaranteed life of 1,000 hours. It is installed in a revolving 9-inch Pyrex contact cylinder. A hinged section at each end of the Printer allows ready access to all electrical controls and drive mechanism for cleaning and servicing. An automatic switch shuts off the light when the end housing of the tube and cylinder are removed. The Printer is made for two currents, 220 volts A.C. 60 cycles, or 220 volts A.C. 50 cycles. The operating electrical requirements for the entire machine amount to only 3,800 watts. The case of the printer is sturdy, and trimmed with durable stainless steel.

The New Model 55BW Bruning Blueprinting Machine

"ALL OUT FOR DEFENSE"

OF OUR CITIZENS AGAINST TRAFFIC ACCIDENTS WITH

CATAPHOTE REFLECTOR—
BEACONS
STOP SIGNS
GUIDE SIGNS
NITEWAY OUTLINERS
LANE AND CURB MARKERS

AND BRING

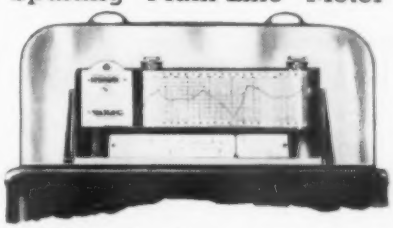
"TOTAL VICTORY"

Cataphote Reflector Buttons are guaranteed for 3 years against loss of brilliance. Fused aluminum reflector surface positively eliminates all air space. Reflecting angularity up to 44 degrees.

Send us your requirements of Plain and Reflector Signs. Let us prove that Cataphote signs are better.

WESTERN CATAPHOTE CORP.
TOLEDO, OHIO

FLOW RECORDER
for use with
Sparling Main-Line Meter



HERE IS what this instrument tells you as you stand before it—

Totalization by remote control from the Sparling Meter, in any unit desired;

Indication in dual equivalent flow rates;

Recording on a 60-day continuous roll chart with the past 15 hours' record clearly visible. Daily and weekly sections of the chart are readily removable.

Charts and scales are evenly spaced from 3 to 100 per cent of maximum rate.

Instrument operates by electric remote control and is available for wall, panel or pedestal mounting. Bulletin 307 will be sent upon request.

SPARLING

3277 Terminal Annex..... LOS ANGELES
3104 Michigan Blvd.....CHICAGO
622 Broadway.....CINCINNATI
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Things sure do move when CHEVROLET TRUCKS go to work

Inspect these

NEW 1941 FEATURES

★ TWO NEW VALVE-IN-HEAD ENGINES . . . STANDARD: 174 FOOT-POUNDS OF TORQUE—90 HORSEPOWER . . . "LOAD-MASTER": 192 FOOT-POUNDS OF TORQUE—93 HORSEPOWER* ★ NEW RECIRCULATING BALL-BEARING STEERING GEAR ★ NEW, MORE COMFORTABLE DRIVER'S COMPARTMENT.

*Optional on Heavy Duty models at extra cost

60 MODELS

ON NINE LONGER WHEELBASES . . . A COMPLETE LINE FOR ALL LINES OF BUSINESS

They have *EXTRA* horsepower . . . *EXTRA* pulling power . . . *EXTRA* earning power

There's a lot of work to be done in this country this year—more material to be moved, and moved fast; more goods to be delivered, and delivered on schedule; more supplies to be hauled, and hauled promptly.

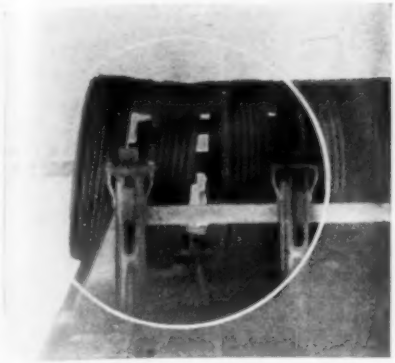
It's a year for heavy duty trucks with extra power—and that makes it a year for Chevrolets, because they are the most powerful trucks in the low-price field.

There are full 90 horsepower and the tremendous *pulling* power of 174 foot-pounds of torque in Chevrolet's Standard engine. If you need more, there are 93 horsepower and 192 foot-pounds of torque—extraordinary pulling power for extraordinary duty—in the special heavy duty "Load-Master" engine, optional at a small additional charge.

Be ready for peak loads—with the trucks that can carry them.

CHEVROLET MOTOR DIVISION, *General Motors Sales Corporation*
DETROIT, MICHIGAN

OUT-PULL . . . OUT-VALUE . . . OUT-SELL



Roll-Tamp wheels fit the surface to compact the soil

A Pneumatic Roller for Bituminous Surfaces

Uniform pressure by every tire in a pneumatic-tired roller designed for compacting sub-base and bituminous-bound road surfacing aggregates is the feature claimed for "Roll Tamp," recently announced by Madsen Iron Works, 5631 Bicket Street, Huntington Park, Calif. This roller is equipped with eight wheels which are equally spaced across the width of the machine. They are mounted upon four axles, two pneumatic-tired wheels per axle, and each axle is pivoted at its center upon greaseless bearings which are carried in a single walking beam. The walking beam is hinged to the front of the machine in a greaseless bearing and operates in a spring-loaded guide at the rear. This mounting allows each pair of wheels to rise vertically and also to oscillate, thus conforming completely to grade variations. In this manner the Roll Tamp gives uniform pressure on every tire, and it is claimed that less rolling is required with this unit than with other types of rubber-tired rolling units.

The Roll Tamp may be loaded either with sacked sand or with some other ballast. The deck of the machine is 80 inches wide by 84 inches long, and the drawbar is 42 inches long, making an overall length of 10 feet 6 inches. The overall height from the ground to the top of the deck is 32 inches. The roller may be loaded to a gross weight of 8,000 pounds. The tires are of the straight groove type, 6-ply and 6.00 x 16 size. The normal load rating per tire is 1,065 pounds at 36 pounds air pressure.

New Bulletin Available on Magnetite Filters

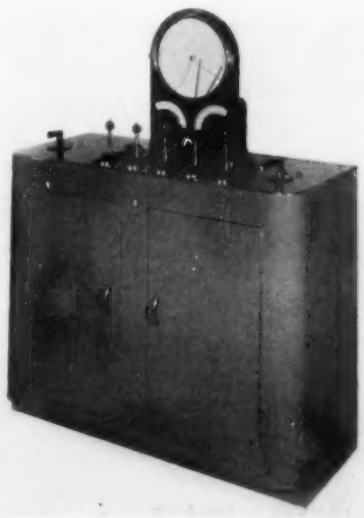
A new 12-page bulletin on the automatic magnetite filter for the removal of non-settleable solids from sewage, has recently been issued, showing the application of this filter to four different types of sewage-treatment plants as indicated by strip flowsheets covering plain sedimentation, chemical precipitation, trickling filter treatment, and the activated sludge process. Another set of sketches shows the various ways in which this filter may be installed, either in a separate structure or in combination with a mechanical flocculator, a mechanical clarifier or a combination of flocculator and clarifier. There is also a page of operating data containing performance figures from six different installations and a list of the 44 automatic magnetite filters now installed at 23 plants, with a design capacity of 300 mgd.

The automatic magnetite filter is manufactured by Filtration Equipment Corporation, 10 East 40th Street, New York, and is marketed by The Dorr Co., Inc., 570 Lexington Avenue, New York. Copies of this new 12-page bulletin may be secured from either company by mentioning this item.

New Streamlined Tables for Operating Filters

A new streamlined table which provides fingertip control of large filter or softening plants has been announced recently by International Filter Co., 325 West 25th Place, Chicago, Ill. This new table may be used for centralized control of backwashing, rewashing and other operations in filter beds, and for regenerating and cleaning zeolite softening beds. The table is built of welded furniture steel, carefully shaped with smooth rounded corners and trimmed with bright chromium-finished strips. The top is of durable, battleship linoleum. Swinging non-warping doors at the front are hung on full-length piano-type hinges, all of which creates a much neater appearance than the marble-topped tables which were introduced over 25 years ago.

The modern appearance of this cabinet is enhanced by the up-to-date operating levers, strip indicators, pump switches and loss-of-head and rate-of-flow gages. The equipment is shipped complete with Infilco 4-way hydraulic transfer switches mounted within the cabinet. This cuts the installation time to a matter of minutes. An installation was recently made at Muskegon Heights, Mich.



The New Infilco Steel Operating Table for Filters

ROUGH ON RUST!

The Rusta-Restor Method of Tank Protection

Many water works men ordered their first RUSTA-RESTOR on trial.

You can do the same.

There's no percentage in letting rust accumulate on your tanks and filter beds. Get rid of it electrically—and stay rid of it, by electricity—the only known means of POSITIVE PREVENTION.

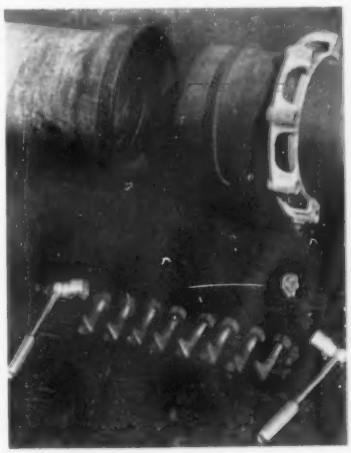
RUSTA-RESTOR TRADE MARK REGISTERED

Circular on request

RUSTA RESTOR CORPORATION

1450 W. State St. Fremont, Ohio

STOP JOINT LEAKAGE



with CARSON MECHANICAL JOINTS

● CHARCOAL IRON BOLTS ●

for Cast Iron Pipes and Fittings also Leak Clamps

WRITE FOR PRICES

Carson-Cadillac Co.

1221 PINSON ST. BIRMINGHAM, ALA.

THE ARM OF THE LAW

NEVER is the expression — "long arm of the law" more true than when applied to officers patrolling streets and highways on dependable Harley-Davidson Police Motorcycles. Covering more territory in less time enables your officers to increase their range of law enforcement and traffic control.

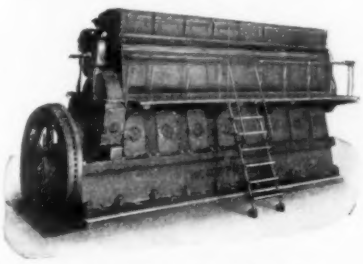
Speeders and reckless drivers don't like to "take chances" with motorcycle officers on the job—and the result is fewer accidents and deaths. Harley-Davidson Motorcycles, with their superior mechanical features and dependable, economical performance, will extend the activities of *your* department as they are doing for more than 3500 other police departments from coast to coast.

HARLEY-DAVIDSON MOTOR CO.
MILWAUKEE, WISCONSIN

HARLEY-DAVIDSON
THE POLICE MOTORCYCLE

Convertible Diesels for Municipal Service

The recent Bulletin 764 on CP Type 16 heavy-duty diesel engines, manufactured by Chicago Pneumatic Tool Co., 6 East 44th Street, New York, is replete with descriptive data, dimensions, and horsepower tables, for these power units which are convertible from diesel fuel to gas. The



The C-P Type 16 Diesel Engine

engine is of the four-cycle direct-injection type, especially designed for continuous duty, such as driving pumps or electric generators. This particular engine is built in sizes from 375 to 1,000 hp, operating at 327 or 300 rpm. Copies of the bulletin mentioned above will be sent free on request to those mentioning this item.

Los Angeles Installs Its 300,000th Meter

The installation of a water meter is not usually considered the time for any particular ceremony. Usually the meter crew gets its orders, goes out with the meter, installs it and turns in its report. Recently, however, on a thoroughfare adjacent to the campus of the University of California, of Los Angeles, a unique ceremony took place when the 300,000th water meter was installed under the supervision of George C. Sopp, Superintendent of Meters and Services, Bureau of Water Works and Supply of Los Angeles. The witnesses included Thad M. Erwin, Water Sales Agent, and L. E. Goit, Engineer in Charge of the Water Distribution System, as well as George Read, who lately had relinquished the job of Superintendent of Meters and Services after forty years' service. The meter was installed at the residence of Mr. and Mrs. Joseph R. Campbell, which is under construction at 10508 Wyton Drive, West Los Angeles.

George C. Sopp, Superintendent of Meters and Services, and George Read, Ex-Superintendent, at the Ceremonial Water Meter Installation in Los Angeles

The newspapers gave prominence to Chief Engineer H. A. Van Norman's statement that there is now one water meter for every five inhabitants, and in typical West Coast manner emphasized this new "yardstick" for gaging the phenomenal growth of Los Angeles.

Water Bureau statistics show the step-by-step increase in meters in the Los Angeles water system as follows: 319 in the year 1902; 5,347 in 1905; 35,955 in 1910; then 69,628, 110,783, 200,935, 243,097 and 253,976 meters in five-year intervals up to 1935, when the increase accelerated, in 1940, to an average increase of nearly 1,000 meters per month.

Speaking for publication, George C. Sopp, Superintendent of Meters and Services, said: "Bear in mind that when the city purchased the old Los Angeles Water Co., in 1902, and commenced operating its own municipal water system, only 319 meters were in service throughout the entire city. At that time—note this fact carefully—Los Angeles was using a total of 26,000,000 gallons daily, or approximately 306 gallons per capita—more gallons of water utilized per capita than by any other city in the United States, and representing for Los Angeles—even with its irrigation demands—a very considerable waste."

The Water Bureau management realized that it was faced with a serious problem, Mr. Sopp explained, and a considerable curtailing of this tremendous waste of water was vital to the well-being of a city located in a semi-arid region where water was none too plentiful and had to be obtained from the high mountain regions several hundreds of miles distant from the city limits.

Purely as an experiment, the management purchased a few hundred additional meters in 1902 and installed them on the system. Results were more than gratifying—they were considered amazing. Despite the constantly increasing population, the daily water consumption was reduced within a short time to a mere 3,000,000 gallons.

Mr. Sopp pointed out that for the fiscal year ending June 30, 1940, the Los Angeles water system was called upon to supply a demand of more than seventy times the requirements in 1902, yet the daily per capita consumption was held to 122 gallons. Such efficient control of water consumption, according to Mr. Sopp, was due almost entirely to 100 per cent metering of all domestic and irrigation services. Metering not only fixes individual responsibility for water consumption, but also affords an equitable basis for taxation or other means of control by which any city can eliminate municipal water waste most effectively.

STEWART
STEEL
Sewer
Rods
(Sectional)

Made of highly tempered steel with an easy, strong coupling.

NO WRENCH NEEDED TO COUPLE

A set of these sewer rods is compact and easy to handle.

2 SIZES:
⅝" "Jumbo" for heavy duty.
5/16" — for speedy light work.

2 LENGTHS:
5 feet and
3 feet

W. H. STEWART
P. O. Box 767, Syracuse, N. Y.
P. O. Box 581, Jacksonville, Florida

PITTSBURGH-DES MOINES
FOR BETTER VALUE at Low Cost

Elevated Steel Tanks

From the first P-DM Elevated Steel Tank (built over 40 years ago and serving well today), to the advanced structures of the present, runs a continuity of *experience* gained in the municipal field which is always at your service. Let a P-DM Engineer consult with you without obligation.

PITTSBURGH - DES MOINES STEEL COMPANY
Pittsburgh, Pa. . . . 3412 Neville Island
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All your needs for Fire Alarm Supplies *Are in our active File!*

Because of GRAYBAR'S all-inclusive service to municipalities throughout the nation, there are no blanks in our active file. *All* your fire alarm needs for complete central office and field construction as well as for maintenance and repair work are promptly available from this one-call source. For prompt delivery on outstanding supply lines, call GRAYBAR today.

TOOLS

TERMINALS

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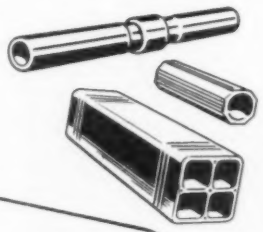
CONDUIT



For safety and dependability, underground fire alarm wiring is at the top of the class. Orangeburg *Standard* and *Nocrete* fibre conduit offers extra economy and flexibility. *Natco* Single or Multiple Duct clay conduit is available in types for high or low tension lines. GRAYBAR will be glad to give you all the facts and figures.

CABLE

BOXES

Horni Standard and Compositrol fire alarm boxes have security features found in no other box. They automatically protect against loss of alarms when operated under abnormal line conditions. Positively non-interfering. *Horni* boxes are simple to install, inspect and maintain. A staff of GRAYBAR specialists is always "on call" to aid you in planning a new system or extending or modernizing your old one.

BATTERIES

Philco Batteries are available in models to meet any fire alarm requirement, for both attended and unattended locations. Long life and reliability are assured. The type 52CF, for example, gives 180 hours reserve in fire alarm service and has a rating of 18 ampere hours at the 100 mil. discharge rate. Ask GRAYBAR for the complete story on these batteries.

ARRESTORS

GraybaR In Over 80 Principal Cities
Executive Offices: Graybar Building, New York, N. Y.

GraybaR QUALITY

Distributed and guaranteed by

GraybaR ELECTRIC COMPANY

New Portable Mixer for City Asphalt Plant

The street-maintenance problems of many cities require the services of a municipal asphalt plant which may be of either the portable or the stationary type. A portable plant has certain advantages, in that it may be moved into a new section of town for the period of time its services are required there. The new "Twin Dryer" portable asphalt plant of Universal Crusher Co., Cedar Rapids, Iowa, on a recent test job produced up to 42 tons per hour of mixed asphaltic pavement, using 245 gallons of MC-2 asphaltic road oil to 1 ton of aggregates. The specifications on the test job called for 30 to 40 per cent gravel of ¼- to ¾-inch screen size, and 60 to 70 per cent sand of ¼-inch and less screen size. In the test run, the 230-gallon fuel tank supplying the dryer burners was filled only once in five days with distillate at 6½ cents a gallon. Only 75 gallons of gasoline for power was used in the same time.

The design of this new portable plant eliminates much conveying and rehandling of material. It has a retractable trailer hitch, so that it can be towed by a truck or tractor. This is pushed under the frame, out of the way, when not in use. The plant is supplied with materials by a conveyor, or fed directly from an overhead bin. There is a twin hopper from which material is metered by mechanical feeder to the twin dryers, sand to one dryer and aggregates to the other. These rotary dryers are heated by oil-fired burners, the heat escaping from the dryers being utilized to heat the asphalt in the 700-gallon tank above. The tumbling and discharge action in the dryers aerates the material, releasing steam, resulting in dryer aggregates. From the dryers the material is elevated by the Rotavator to the screw pug-mill.

Hot oil is added to the pug-mill, and the agitator screws blend the material, at the same time conveying it to a swivel chute for convenient truck loading. The plant is 9 feet 6 inches wide, less than 30 feet long, 11 feet 2 inches high, and weighs only 11 tons. The rear wheels are dual pneumatic-tired. Full information regarding the machine will be found in a new bulletin, No. 57, which is available from the Universal Crusher Co., 642 C Avenue, West, Cedar Rapids, Iowa.

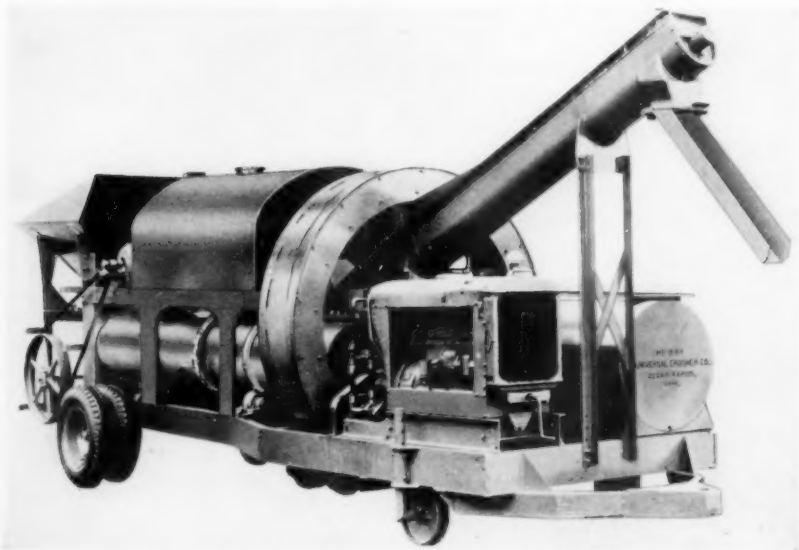
Ackerman Named to New Post at Dodge

Appointment of J. R. Ackerman as Director of Merchandising and Advertising, Dodge Division, Chrysler Corporation, Detroit, Mich., has been announced. Mr. Ackerman has been associated with Dodge for several years, formerly as a field manager and then, until his present appointment, as Assistant Director of Truck Merchandising at the factory in Detroit. Mr. Ackerman has been engaged in the automobile business almost continuously for a period of more than twenty years.

Johns-Manville Opens New Southern Office

A new southern office has been established by Johns-Manville of 22 East 40th Street, New York, to facilitate service to municipalities as well as to the rapid-growing industry of the South. The new district, with headquarters at Atlanta, Ga., will serve the states of Georgia, Tennessee, North Carolina, South Carolina, Florida, Alabama and Mississippi.

Thomas J. Roberts, formerly assistant to T. K. Mial, Vice-President in charge of industrial sales and product development, will be in charge of the new district. Mr. Roberts is a graduate of Cornell University with a civil engineering degree, and has been with the power products and industrial department of Johns-Manville since 1925.



The New Universal Twin-Dryer Portable Asphalt Plant

SYNTRON

"GRAVIMETRIC"
FEEDER MACHINES
for Accurate
Dependable
Dry Chemical Dosage
by Weight

SYNTRON

"VOLUMETRIC"
FEEDER MACHINES
for Automatic
Dry Chemical Dosage
from Flow Meter or
pH Indicator Control

SYNTRON COMPANY
420 LEXINGTON AVE., HOMER CITY, PA.

See page 30 of
our new 96-page catalog
for information on this
WATER PRESSURE
REDUCING VALVE

Illustrated—
Single Globe
Pilot Pattern

These valves maintain a constant downstream pressure against any higher upstream head;

—operate without any shock or jar, owing to inherent air and water cushioning;

—and they do not hunt in positioning themselves for the necessary rate of flow, owing to the sensitive pilot valve control —thus *wear* on the renewable cups and seat washer is *minimized*.

GOLDEN-ANDERSON
VALVE SPECIALTY CO.
Fulton Building Pittsburgh, Pa.

ALUMINUM, DEFENSE, AND YOU

ALCOA

1

WE INTERRUPT our regular messages to report what's what with aluminum.

AT THE MOMENT delivery for civilian use must make way for defense. Everybody knows the reason. Defense requires and is using more aluminum per month than peacetime America ever consumed.

NEVERTHELESS, we intend that no one shall have to forego the things aluminum can do best one minute longer than we can help.

THERE IS NO SHORTAGE of bauxite, nor of anything else, except time. And Father Time is being given the race of his life.

WE ARE MOVING, for example, 35,000 yards of earth a day at Alcoa, Tenn., to get 50 acres under a single roof by September. It will require 193 carloads of roofing felt. Some of the operations in that plant will start even before the walls are up. That's an annual rolling capacity for 120 million pounds of high strength alloy sheet coming along fast.

LAST MARCH WE STUCK the first shovel in a cow pasture near Vancouver, Wash. In September a 30 million pound plant was delivering metal. It has been doubled, already. A third 30 million pound unit starts delivering in April; a fourth in May; a fifth in June. From cow pasture to 150 million pounds annual capacity in 15 months.

A SIDELIGHT: To make that 150 million pounds of aluminum, we first have to build factories to make 120 million pounds of carbon electrodes. We have to obtain the equipment (transformers, rectifiers, and the like) to feed 162,500 kw. of electricity into the reduction furnaces. This is a generating capacity equal to that of the state of Delaware plus twice that of Mississippi.

WHAT OF TOTAL PRODUCTION? In addition to Vancouver, further installations are being made at other of our plants, so that in less than a year their total capacity will be more than double that of 1939, when 327 million pounds were produced.

IN THE VERY MIDST of this demand we have lowered the price of aluminum ingot 15%. We state, without reservation, our hope that the price can be still further reduced.

DEFENSE APPLICATIONS use aluminum for exactly the same reasons you do. Defense priorities on aluminum simply say that there are some fundamental things that aluminum does supremely well. It will do them still better as important lessons in production, fabrication, and application are learned from every additional pound being produced and used.

YOU, SIR, have been using aluminum in many forms, for many different purposes. It is not easy nor convenient to have to substitute other materials temporarily. We want you to know that we intend to make this hardship as short-lived as possible. Your aluminum is on the way. It is a promise.

ALUMINUM COMPANY OF AMERICA

The New 10S CMC Trailer Mixer

Fast Trailer Mixer Has Air-Cooled Engine

A new trailer-model concrete mixer equipped with a V-type air-cooled engine has been added to the line of Construction Machinery Co. trailer mixers, made in Waterloo, Iowa. This trailer is a 10S machine, and with the air-cooled engine has added power with the elimination of considerable weight as well as cold-weather hazards.

This manufacturer also makes 5S and 7S trailers equipped with air-cooled engines. A new CMC catalog, "Speedmixing," describing the performance of each of these units, is available to readers on request.

Chain Belt Elects Merwin as President

At the annual meeting of the Board of Directors of Chain Belt Co., 1600 West Bruce Street, Milwaukee, Wis., J. C. Merwin, Vice-President and Treasurer, was elected President of the company, to succeed C. R. Messinger, who died on February 4. G. M. Dyke, Assistant Treasurer, was elected Treasurer, and A. F. Kessler, also an Assistant Treasurer, was elected to the new office of Comptroller. Walter Kasten, President of the First Wisconsin National Bank of Milwaukee, was made a Director at the annual stockholders' meeting which preceded the directors' meeting.

To Handle Indiana Sales for Barber Asphalt

President James Auten of the Barber Asphalt Corporation, Barber, N. J., announced recently that The Highway Company, with offices at Zionville, Ind., will handle the exclusive sale, within the state of Indiana, of all Barber products for the construction and maintenance of streets and highways, including Trinidad Native Lake Asphalt.

The Highway Company will operate under the management of C. G. Alfs, who has had long experience in this line.

What the TATE Cement Lining Process Can Do for Your Old Water Mains . . .

The fact that pumping costs increase and capacities decrease need no longer worry water works men.

Such conditions are most often laid to tuberculated pipe lines where the flow of water has decreased to an alarming rate. The TATE Process will correct that PERMANENTLY.

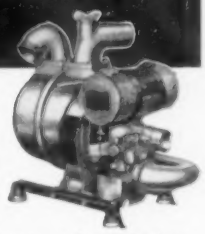
This is what the TATE Process accomplishes . . . and most economically, too.

- **Water mains cleaned and cement-lined without removing pipe.**
- **Eliminates discoloration and further cleaning costs.**
- **Reduces pumping costs.**
- **Restores reduction in head and flow co-efficients. This means full fire protection and lowered insurance rates.**
- **All joints cement-lined . . . just one continuous pipe.**
- **Does the job without interruption of service to consumer.**

A full description of the TATE Process is contained in the following articles: 1. Lining Cast Iron Mains with Concrete—in place, J. E. Gibson, "Construction" issue February, 1940; 2. Applying Cement Mortar Lining to Existing Mains in England, Thomas H. Wiggin, Journal "A.W.W.A." 27: 1073, 1935; 3. Cleaning and Lining Existing Pipe Lines in Buenos Aires, Bruce Harkness, "J.N.E.W.W.A." 53: 284 (Sept.) 1939; 4. Lining Cast-Iron Mains in Position with Cement Mortar, J. E. Gibson, Journal "A.W.W.A." May, 1940.

TATE PIPE LININGS, INC. ANDOVER, MASS.

HOMELITE
PORTABLE PUMP



A Homelite Portable Pump is like a rainbow after a storm. Light and portable, you can get it on the job instantly. You can put it into action right after the rain and dry out your ditches or excavations in no time. Moreover, being self-priming, a Homelite will keep seepage right down to strainer level at all times. Your men are sure of best working conditions. Delays are eliminated. Time and money are saved.

Although a Homelite Pump weighs only 91 pounds complete with built-in gasoline engine it can out-pump pumps many times its weight. It handles 15,000 gallons per hour—has a 28-foot suction lift—pumps muddy water thick with solids without clogging—and it's the kind of a pump that won't break down the minute you work it overtime.

Send for our new pump bulletin showing all the Homelite Portable Pumps and all the ways you can use them.

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CORPORATION
204 Riverdale Ave., Port Chester, N. Y.

Smooth riding comfort . . . combined with the longest life and lowest upkeep of any widely used pavement.

Always the least costly . . . now the best riding

A swift succession of important advances in brick pavement construction have followed each other throughout the past few years.

Result: Modern brick pavements are unexcelled in riding qualities.

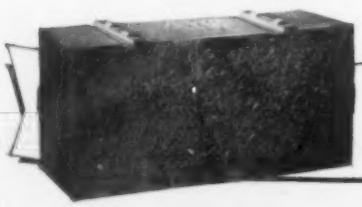
There have been advances in technique such as surface filler removal and rolling on boards. There have been basic structural improvements such as the mastic cushion and manufacturing progress such as wire-cut vertical fibre wearing surfaces and de-airing.

Hence, modern brick is a streamlined version of the pavement type that has longest life and lowest maintenance.

This progress comes at a time when it is most useful. For now it is known that brick has by far the greatest resistance to weather damage—starting point of most pavement failures.

Today, modern brick is the perfect surface for any vehicles at any speed plus the lowest cost per year of service. Use it wherever a first-class pavement is called for. National Paving Brick Association, National Press Building, Washington, D. C.

Entrance to Queens-Midtown Tunnel — New York City



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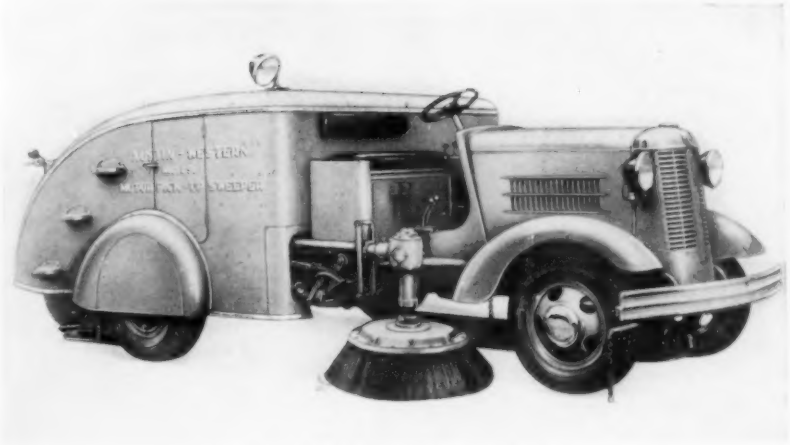

The Austin-Western Model 50 Sweeper

New Model in Austin Motor Pick-up Sweepers

A new 2½-cubic-yard capacity sweeper, that cleans a path 9 feet wide, has been announced by The Austin-Western Road Machinery Co., Aurora, Ill. In this new Model 50, both of the brooms and the self-cleaning beltless elevator are independently raised and lowered by hydraulic power, operated by convenient levers within easy reach of the operator. Through an auxiliary mechanical arrangement, the brooms are made to hug the pavement without "dancing"; however they can rise or fall when broad, irregular surface sections are encountered. The brooms have two speeds—one for ordinary and one for hard sweeping conditions.

A four-wheel, reinforced chassis, using solid axles, gives the sweeper a truck-like stability and serves to maintain the alignment of the working parts. The headlights have been moved forward from the dash to the radiator, to improve general visibility and reduce shadows during night operation. All wheels have been equipped with mud-guards, and a newly-designed bumper gives more clearance when passing parked cars. Water tank, filling hose, dirt hopper, clamps, and sprockets are completely enclosed.

IMPROVED GEARED PUMP HEAD

FULFILLS EVERY DEMAND MADE ON ENGINE-DRIVEN WATER PUMPING EQUIPMENT

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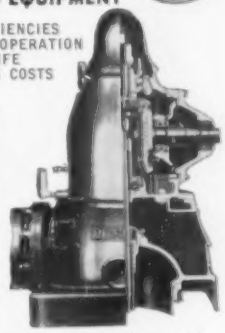
FOR HIGHEST EFFICIENCIES
FOR TROUBLE-FREE OPERATION
FOR LONG SERVICE LIFE
FOR LOWER PUMPING COSTS



Although as precise in construction as a machine tool, Peerless Gearturbo (right angle gear drive) Pumps are as rugged in operation as a heavy-duty truck. The Gearturbo head is not only adaptable to Peerless Pumps but to all other makes as well. Now, new improvements in Gearturbo design enhance its value. Variety of speed ratios available, for use in all services, with gas, gasoline or diesel engines. Gearturbo may be used in combination with an electric head to provide a pumping unit with never-failing source of power.

Ask for New Literature

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All gears are heat-treated nickel-alloy steel for long life.
Double-row ball bearings on both horizontal and vertical shafts.
All bearings and gears automatically lubricated by cooled oil under pressure.

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Food Machinery Corp.
Factories: Los Angeles, San Jose, Fresno, Calif., and Canton, Ohio.

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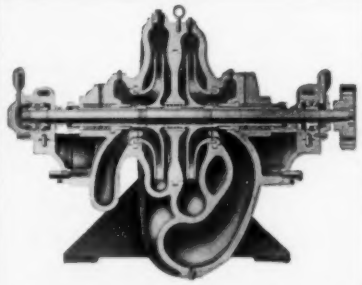

• Opposed impeller pump with ball bearings.

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combine simplicity with high efficiency

AXIAL balance is obtained by facing the two single-suction impellers in opposite directions, which permits of using a short, stiff shaft and reduced clearances, resulting in reduced leakage. Only two pairs of wearing rings to reduce leakage from discharge to suction are needed and leakage between stages is minimized by a labyrinth shaft sleeve, which also protects the shaft from wear, while a bushing protects the diaphragm.

Opposed impeller pumps are built for capacities up to 1500 g.p.m. and for heads up to 750 ft., and higher, depending upon speed and capacity. Ask for Catalog P-3212.

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For CONTROL and COMMUNICATION CIRCUITS

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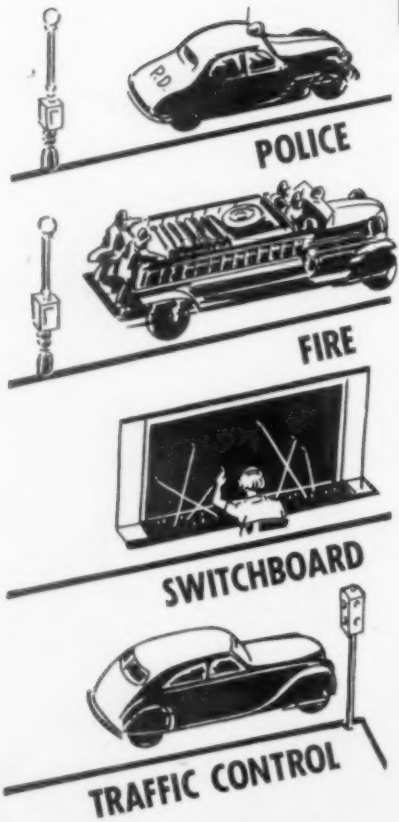

and other low voltage circuits in limited duct spaces.

Tough, resilient, long lived, Hazard Permex Thin Wall meets the requirements of IMSA Specification No. 17 for use in limited duct areas.

Low electrostatic capacity of this insulation makes it suitable for communication as well as for low voltage control and signal circuits.

Hazard Permex Thin Wall is free stripping and will not corrode conductors. It will stand exposure to light and air and has great resistance to oxidation.

High tensile strength—over 2500 lbs. per square inch and over 500% elongation under test conditions prove the high quality of this all new unused best Hevea rubber insulation.

Write for details of sizes, constructions and prices

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Division of the Okonite Company
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HAZARD
Wires and Cables for Municipal Requirements

New Automatic Alarm for Combustible Gases

A new alarm which automatically sounds a warning or operates a control circuit when the concentration of combustible gases exceeds a predetermined amount, has been announced by Mine Safety Appliances Co., Braddock, Thomas and Meade Streets, Pittsburgh, Pa. This device is of particular value for municipal sewage-treatment plants where sludge digesters are installed, and the sludge gas is used for power or heat which might cause hazardous accumulations of the gas through leaks in distribution pipes.

In operation, the new M-S-A combustible gas alarm requires very little attention. It is necessary to check the zero setting in fresh air approximately once each week and oil the motor once a month. The filaments require replacing at intervals of several months, but this is done quickly and conveniently at very little expense. The unit consists of an impeller fan driven by a small electric motor which draws a sample of the atmosphere under test continuously over one of two heated platinum wires. These wires are part of a balanced electrical circuit across which is connected a sensitive indicating relay. This relay will indicate the relative concentration of gas present in the atmosphere under test up to that concentration at which the alarm has been set to operate the signal circuit.

When a concentration sufficient to close the alarm circuit is present, the relay circuit is closed, thus energizing the alarm signal and at the same time de-energizing all other electrical circuits within the apparatus. This latter feature is included as an additional safety feature.

Ryan, President of MSA, Dies in Florida

John T. Ryan, who has been President of the Mine Safety Appliance Co., Pittsburgh, Pa., since he organized it with George H. Deike in 1914, died on February 20, 1941, in Miami, Fla. During his entire business life he was identified with the mining industry. After graduation from Pennsylvania State College in 1908, he became affiliated with the Rocky Ridge Coal Co. and later was Superintendent and Mining Engineer for the Langdon Coal Co., of Huntingdon, Pa.

From 1911 to 1914 he was in charge of mine rescue and safety, and the mine lamp testing division of the United States Bureau of Mines. In 1915 Mr. Ryan worked with Thomas A. Edison in the inventor's laboratory at West Orange, N. J., on the design and development of the Edison Safety Cap Lamp, which is used universally today in underground coal and metal mines. In December, 1940, he was made an Honorary Member of the Edison "Old Timers' Club" composed of men who worked with the late inventor in his early years.

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with a
MADSEN PUG MILL

MADSEN mixers have a reputation for longer life and faster operation. They mix and discharge faster. Mixer wearing sections and paddle tips made of high-test white iron. Broad-faced steel cut tooth timing gears, Mixer shafts of high tensile steel and real built-in value assure the operator of the lowest possible operation cost. Horse-power requirements are low because these mixers are scientifically designed.

500 lb.—1000 lb.—1500 lb.—2000 lb.—3000 lb.—4000 lb.—and 6000 lb. capacities.

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DOUBLE EFFICIENCY WITH THIS COMBINATION

No. 1-WE Compound Lever Tree Trimmer clips 1¼" branches easily. Furnished with 30" top sections and either 6' or 8' extra handle sections of 1¼" (Sitka Spruce) Octagon Pole. Pruner and Saw combination illustrated is used by telephone companies, utilities and tree experts. Write for catalog.

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For destroying and preventing the growth of wood-destroying fungi and for the protection of wounds, use Bartlett Tree Paint. Easily applied with ordinary paint brush.

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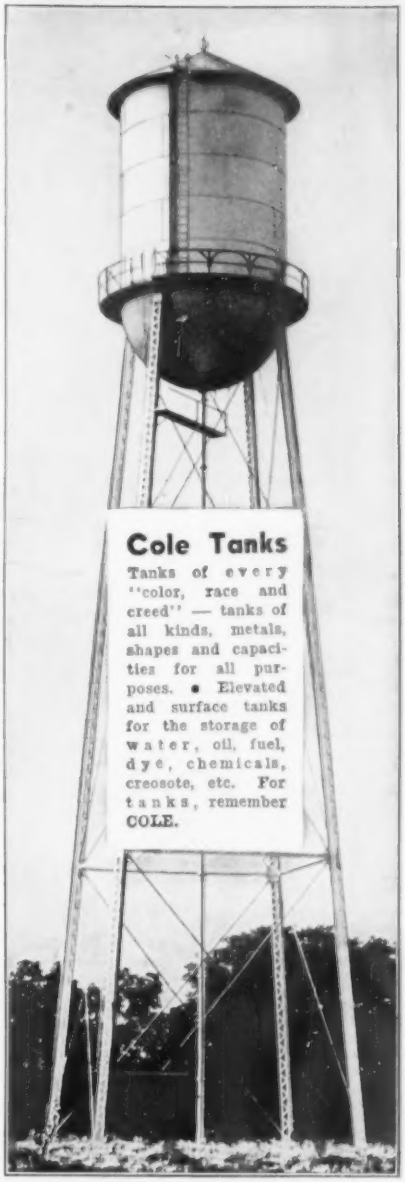

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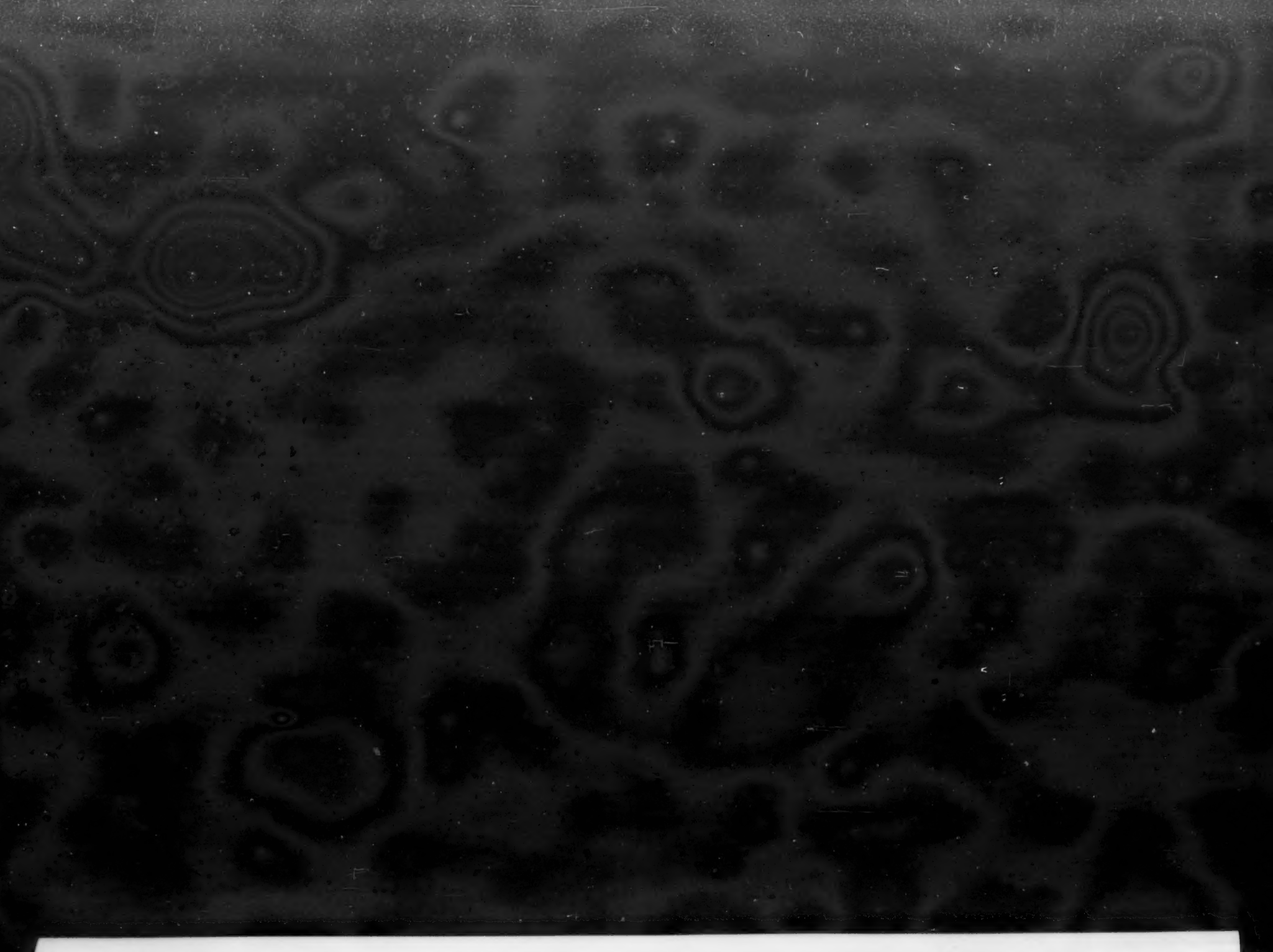

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